Saskatchewan

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Agriculture Development Fund

FINAL REPORT

MACHINERY CO-OPERATIVES: NEW MODELS FOR SASKATCHEWAN

19980098

Funded by
The Agriculture Development Fund
October 1999

Prepared by: University of Saskatchewan

SAF
Saskatchewan Agriculture & Food
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100-06126/

98000098

MACHINERY CO-OPERATIVES: NEW MODELS FOR SASKATCHEWAN

- FINAL REPORT -

OCTOBER 29, 1999

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For Submission to the Agricultural Development Fund

Executive Summary

The mechanization of agriculture, while allowing for gains in productivity, has also contributed to a large economic drain on some farmers. In response, an increasing number of farmers have looked to farm machinery arrangements, which provide an alternative to ownership and the associated capital burden. Farm machinery co-operatives are one example of alternative farm machinery arrangements being considered by an increasing number of Canadian farmers. Quebec farmers in particular have adopted the co-operative structure as a way of reducing the costs associated with operating and financing farm machinery and equipment.

The particular type of machinery co-operative being adopted in Quebec is known as the CUMA, Coopérative d'Utilization de Matériel Agricole. Since 1991, more than 1000 farm operations have become members of the more than 47 CUMAs established in Québec.[1] This development has meant a 70 percent reduction in the machinery costs of some farmers.[2]

The purpose of this project, funded by the Agricultural Development Fund, was to: (a) determine the applicability of the CUMA model of farm machinery co-operative to Saskatchewan agriculture; and (b) assess the potential impact of similar machinery co-operatives on the machinery and equipment costs of Saskatchewan farmers.

The results of the research conducted for this project is compiled in three booklets:

- *Farm Machinery Co-operatives: An Idea Worth Sharing* - documents the results of a financial model developed to compare the costs of owning selected types of farm machinery as individual farmers and as members of a farm machinery co-operative.
- *The CUMA Farm Machinery Co-operatives* - includes: a detailed description of the CUMA administrative and organizational structure; an overview of the CUMA development process; a discussion of the evolution of the CUMA movement in Quebec; and a sample set of bylaws and subscription contract.

[1] Government of Quebec, 1994.
[2] Morisette, 1992.

- *Farm Machinery Co-operatives in Saskatchewan and Quebec* - describes the different organizational structures used by farm machinery co-operatives in Saskatchewan and Quebec and includes case studies of farm machinery co-operatives. Guidelines for the formation of a successful farm machinery co-operative are also provided.

Farm Machinery Co-operatives: An Idea Worth Sharing

A financial model developed for this project compares the costs of owning farm machinery as individual farmers with the costs of owning machinery as members of a farm machinery co-operative. Key results from comparing the costs associated with the selected individual machines indicate that, on average, a mixed grain farmer with 1,500 cultivated acres can expect to save 34 percent in total machinery costs per acre by sharing a piece of machinery with at least two other farms of equal size, as opposed to owning the machine individually. The savings in total machinery costs are due to the combination of lower fixed costs per hour (an average saving of 22 percent) and reduced hours required to operate the machine (an average saving of 32 percent).

Key results from a comparison of the costs associated with whole machinery sets indicate that under a conventional seeding system annual fixed costs are 45 percent lower and operating costs are 14 percent lower for the co-op member. As a result, total annual machinery costs are 36 percent lower for the co-op member than for the individual owner. Under a direct seeding system the combination of lower fixed costs and lower operating costs translate into an estimated overall saving in total annual machinery costs of 33 percent for a co-op member versus an individual farmer-owner.

The CUMA Farm Machinery Co-operatives

The CUMAs have, for the most part, been formed by dairy farmers interested in sharing forage equipment, such as harvesters, seeders, and hay balers. Joining a CUMA can help decrease machinery costs as well as overall production costs. Sharing machinery also

allows for the purchase of the most up-to-date equipment and equipment which is larger than what individual producer could purchase alone.[3]

The mandate of the CUMAs is to share equipment among its members at the lowest possible cost. CUMAs are structured to allow the sharing of individual machines among sub-sets of members through the use of activity branches and subscription contracts. To obtain the right to use the equipment and machinery owned by the CUMA, participating members must join an activity branch. Each activity branch corresponds to the use of one machine, piece of equipment or service. Upon joining an activity branch, each member must sign a subscription contract which commits them to using the particular piece of equipment or machine for a specific amount of time or number of units per year for the duration of the contract.

The success of the CUMAs in lowering the machinery costs for the producers involved raises the questions: Can CUMAs work in Saskatchewan? And under what conditions would a CUMA structure be appropriate? In general, the features of CUMA co-operatives appear to be well suited in situations where some or all of the following features are present:

- some or all of the producers involved wish to share only certain, individual machines;
- members cannot agree on equipment selection for the entire group;
- timeliness issues are minimal—large losses in income are not sustained if machinery is not used optimally;
- members would like to begin sharing machinery gradually, starting with less-critical or expensive machines, either because they do not know each other well or they wish to limit their initial capital investment in the co-operative;
- members do not share similar production methods.

Farm Machinery Co-operatives in Saskatchewan

Farm machinery co-operatives in Saskatchewan operate almost exclusively in the grain sector and tend to have five or fewer members. The primary motivation behind the formation of farm machinery co-operatives in Saskatchewan is the lowering of machinery

[3] Government of Quebec, 1994.

costs. Secondary reasons include the ability to share labour and to enable a younger generation of people to get involved in farming without a large debt burden.

Farm machinery co-operatives operating in Saskatchewan can be grouped into two different categories:

- those in which machinery and income is pooled among all members of the co-op;
- those in which machinery is pooled among all members of the co-op, but income is not pooled.

In both cases the co-op members share the bulk of the equipment and machinery required to perform core farm operations.

The structure of Saskatchewan co-ops are based on a member formula developed by the group. The formula determines each member's equity contribution to the co-op and their share of the operating expenses and machinery costs. Co-ops which pool production also use the member formula to allocate net income.

Saskatchewan-style co-operatives in which production is not pooled and only machinery is shared, appear to be well suited to situations where one or more of the following features are present:

- the members involved wish to share entire machinery sets, as opposed to individual machines;
- members wish to make production decisions independently, but share similar production methods;
- there may be a loss in income if machinery is not used optimally, but members feel that the benefits from sharing machinery outweigh the losses;
- members wish to share labour and want to take advantage of particular areas of expertise within the group.

Saskatchewan-style co-operatives in which returns and production is pooled as well as machinery and equipment, appear to be well suited to situations where some or all of the following features are present:

- the members involved wish to share entire machinery sets;
- the potential for conflict regarding machinery use is high;
- members are willing to make production decisions together as a group;

- members wish to share labour and want to take advantage of particular areas of expertise within the group.

There are a number of factors which are critical to the successful formation of any farm machinery co-operative, regardless of how the co-operative is. These factors include: compatibility of the people involved; clear economic benefits; good communication; maintenance of accurate records; written agreements; and appropriate levels of investment.

Technical Report

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Introduction

The mechanization of agriculture, while allowing for gains in productivity, has also contributed to a large economic drain on some farmers. In response, an increasing number of farmers have looked to farm machinery arrangements, which provide an alternative to ownership and the associated capital burden. Farm machinery co-operatives are one example of alternative farm machinery arrangements being considered by an increasing number of Canadian farmers. Quebec farmers in particular have adopted the co-operative structure as a way of reducing the costs associated with operating and financing farm machinery and equipment.

The particular type of machinery co-operative being adopted in Quebec is known as the CUMA, Coopérative d'Utilization de Matériel Agricole, loosely translated as "co-operative for the use of farm implements." Since 1991, more than 1000 farm operations have become members of the more than 47 CUMAs established in Québec.[4] This development has meant a 30 percent reduction in the machinery costs of some members.[5]

Project Objective

The purpose of this project, funded by the Agricultural Development Fund, was to:

(a) determine the applicability of the CUMA model of farm machinery co-operative to Saskatchewan agriculture; and

(b) assess the potential impact of similar machinery co-operatives on the machinery and equipment costs of Saskatchewan farmers.

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[4] Government of Quebec, 1994.
[5] Morisette, 1992.

Methodology

The project's objective was met through two research phases:

- Part One involved a review of the existing literature and research on the development, structure and impact of CUMAs in Québec.
- In Part Two the suitability and potential for the development of machinery co-operatives in Saskatchewan based on the CUMA model was assessed. The possible impact of the adoption of this model on the machinery and equipment costs of Saskatchewan farmers was examined.

Part One of the research involved:

- A review of the existing literature on CUMAs in Quebec and France. Particular emphasis was placed on research documenting the economic impact of these arrangements on the machinery and equipment costs of member-farms and on how the equipment is allocated to members during peak use times.
- Interviews with members of nine separate CUMAs were conducted. Based on these interviews, case studies of established and newly formed CUMAs were developed to highlight the structure of these co-operatives and to outline the process involved in the formation and development of the CUMAs.
- Interviews with key people involved in the development of CUMAs in Quebec and Ontario were conducted in order to understand the organizational and legal structure of CUMAs and the role of financial institutions, governments, existing co-operatives and other external advisors have played in the formation and success of CUMAs in Quebec.

Part Two of the research involved:

- Interviews with the members of five farm machinery co-operatives operating in Saskatchewan. Based on these interviews, case studies of Saskatchewan farm machinery co-ops were developed. The case studies highlight the structure, the

reasons behind the formation, and the keys to the success of Saskatchewan farm machinery co-ops.

- The development of a financial model of Saskatchewan farm operations to analyze the impact of machinery sharing arrangements on farm-level machinery and equipment costs. The model is based on a partial budget approach.

Research Summary

The results of the research conducted for this project is compiled in a series of three booklets:

- *The CUMA Farm Machinery Co-operatives* - provides: a detailed description of the CUMA administrative and organizational structure; an overview of the CUMA development process, including the steps involved in forming a CUMA; a discussion of the evolution of the CUMA movement in Quebec and how CUMAs have sparked interest in other forms of co-operative arrangements, in particular the sharing of farm labour. A sample set of bylaws and subscription contract are also included.
- *Farm Machinery Co-operatives in Saskatchewan and Quebec* - describes the different organizational structures used by farm machinery co-operatives in Saskatchewan and Quebec and includes five case studies of farm machinery co-operatives. Guidelines for the formation of a successful farm machinery co-operative and for choosing an appropriate organizational structure are also provided.
- *Farm Machinery Co-operatives: An Idea Worth Sharing* - documents the results of a financial model developed to compare the costs of owning selected types of farm machinery as individual farmers and as members of a farm machinery co-operative.

The following sections provide a summary of key research results which are contained in the booklets. Complete versions of the booklets are provided as appendices to this report.

Saskatchewan Farm Machinery Co-operatives

To date there are 38 co-operatives which are registered as farm/machinery co-operatives in Saskatchewan. It is estimated that less than half of these co-operatives are set-up with a mandate to share farm machinery and equipment among independent farmers. The majority of the co-operatives registered as farm/machinery co-operatives are co-operative farms, which pool land as well as machinery among a group of farmers.

Farm machinery co-operatives in Saskatchewan operate almost exclusively in the grain sector and tend to have five or fewer members. The primary motivation behind the formation of farm machinery co-operatives in Saskatchewan is the lowering of machinery costs by being able to jointly purchase larger, more efficient machines or by being able to purchase machines that individual members could not afford alone, such as a high clearance sprayer or combine. Secondary reasons include the ability to share labour and to enable a younger generation of people to get involved in farming without a large debt burden.

Farm machinery co-operatives operating in Saskatchewan can be grouped into two different categories:

- those in which machinery and income is pooled among all members of the co-op;
- those in which machinery is pooled among all members of the co-op, but income is not pooled.

In both cases farmers join together to pool whole sets of farm machinery. In short, the co-op members share the bulk of the equipment and machinery required to perform core farm operations.

The structure and operations of Saskatchewan farm machinery co-operatives are based on a member formula or agreement developed by the group. The formula determines each member's equity contribution to the co-op and their share of the operating expenses and machinery costs. Co-ops which pool production also use the member formula to allocate net income.

The governance structure of Saskatchewan co-ops is based on a board of directors who are elected by the members at an annual general meeting. Members each have one vote in

electing directors and in voting on major policy decisions affecting the co-operative. Since many machinery co-operatives in Saskatchewan are small, all of the members are generally involved in governing the co-operative. Decisions are typically made by consensus and informal meetings are held on a regular basis for the purposes of communication and to make joint decisions.

Machinery requirements are based on the combined cultivated land base of all co-operative members. As a result, farmers can benefit from economies of scale and can purchase larger, more efficient equipment than would make sense for an individual farm.

The fear that two or more members might have to use a particular machine at the same time is one of the biggest reasons why many Saskatchewan farmers are reluctant to share farm machinery, especially with seasonal equipment such as seeders and combines. However, none of the members of Saskatchewan machinery co-ops interviewed as part of this project mentioned any significant conflicts around the timing and scheduling of machinery.

In co-operatives where income was pooled as well as machinery, members felt that the pooling of income is an important factor in helping to eliminate concerns over scheduling. In co-ops where income was not pooled, members shared an "it all works out in the end" attitude—they felt that to achieve the economic benefits from machinery sharing some compromise is necessary. In some cases, critical operations such as seeding and harvesting were completed together to avoid scheduling conflicts.

Labour is also pooled in both types of Saskatchewan farm machinery co-operatives. The sharing of labour enables the members to take advantage of or develop expertise in particular areas. The sharing of labour can also allow some members to either work more or less depending on their needs.

The CUMA Co-operatives

The CUMAs, Coopératives d'Utilization de Matériel Agricole (loosely translated as co-operative for the use of farm implements) have, for the most part, been formed by dairy farmers interested in sharing forage equipment, such as harvesters, seeders, and hay balers.

According to GREPA (an economic and agricultural research group), equipment costs on Quebec dairy farms comprise about 20-25 percent of their total expenses. Joining a CUMA can help decrease these expenses, as well as overall production costs. Some estimate that the equipment and machinery costs are lowered by as much as 70 percent.[6] Using shared machinery also allows for the purchase of the most up-to-date equipment, which is larger than what individual producer could purchase alone. On farm efficiency is therefore improved considerably.[7]

Like other farm machinery co-operatives, the mandate of the CUMAs is to share equipment among its members. A CUMA owns the equipment and then rents it out to its members at the lowest possible cost. However, unlike Saskatchewan farm machinery co-operatives in which entire machinery sets are pooled among all members, CUMAs are structured to allow the sharing of individual machines among sub-sets of members. The sharing of individual machines is facilitated through the use of activity branches and member contracts.

To obtain the right to use the equipment and machinery owned by the CUMA, participating members must join an activity branch. Each activity branch corresponds to the use of one machine, piece of equipment or service. A minimum of 3 members per branch is recommended.

Upon joining an activity branch, each member must sign a subscription contract which commits them to using the particular piece of equipment or machine for a specific amount of time or number of units per year for the duration of the contract. The duration of the contract is typically the same length of time over which the machine is being financed (usually three to five years).

To join an activity branch each member must purchase a certain number of investment shares which provides the CUMA with the equity capital needed to purchase the machine. Member investment shares do not receive interest and are typically used to finance 20 to 30 percent of the purchase cost of the equipment. In most cases, member investment shares are divided equally among all branch users.

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[6] Lebel, 1995.
[7] Government of Quebec, 1994.

The remaining 70 to 80 percent of an activity branch's capital costs are covered through loans with financial institutions, such as credit unions or banks. The period over which a machine is financed corresponds to the length of the subscription contract signed by each branch member. Financing periods are purposefully kept short to ensure a relatively quick turn over in the equipment and machinery. Quick turnover rates allow members to take advantage of technological advances.

In addition to paying their share of the 20 to 30 percent of the purchase cost of the equipment, members must also pay member fees on a regular basis—typically four times a year or season. Member fees are used to cover the annual rent of the equipment which includes:

- the real cost of financing (capital and interest) the equipment;
- the inherent costs of using the equipment, including insurance, repair and maintenance costs, and storage costs.

A member's share of the annual rent is determined in proportion to the member's use of the equipment in the given year and the amount of use they have committed to in their subscription contract.

In the case that a member is unable to use the equipment as much as he or she has committed to in the subscription contract, the member is still bound to respect the financial agreement set forth in the contract.

Each member is entitled to one vote in electing directors and in making other decisions regarding the co-operative, regardless of the number of activity branches to which they belong or the amount of money they have invested in the co-op. Voting by proxy is not allowed.

The board, based on the recommendation of the branch members, designates someone to be in charge of each activity branch. The branch manager organizes the use of the equipment or machine, including administering schedules. He or she also ensures that contractual agreements are kept, that is, members adhere to their subscription contract. In some cases a member is also chosen to be responsible for equipment care, although the tasks of branch manager and equipment manager are often combined. The equipment manager is in charge of the upkeep, delivery and repair of the equipment.

Both branch and equipment managers report to the board. Before each annual general meeting, branch managers of each activity branch to hold a meeting of their members for the purpose of evaluating the season just ended. Any concerns are then taken to the board at the annual general meeting.

The order by which the members of an activity branch use the machines and equipment is determined through a draw held in the first year of operation, or by some other means deemed acceptable by the majority of the branch members. For example, machinery use can be allocated according to soil types or types of seed being planted.

In a CUMA, each member is responsible for operating the equipment and machinery independently. However, some CUMAs have developed activity branches in order to share general farm labour. For the members, sharing labour this way allows for greater access to a stable supply of skilled labour. For the worker, the CUMA provides stability as the labour requirements are spread among a number of producers.

The CUMA Development Process

The process involved in forming a CUMA is much the same as that involved in forming other kinds of co-operative business. In a guide developed to assist producers interested in forming a CUMA the CUMA development process is described as a 3-stage procedure:

- Stage 1 - Consultation: which involves getting potentially interested producers together to discuss the idea of a CUMA.
- Stage 2 - Organization: where participating producers identify their machinery and equipment needs. In this stage the incorporation documents are also developed.
- Step 3 - Formation: a general assembly must be called within 60 days of the signing of the incorporation documents. Once the co-operative is formed and the activity branches are created, the co-op can begin to function. Those elected to the board of directors can start purchasing the equipment and machinery.

Although the central players in the development of a CUMA are undoubtedly the producer-members themselves, there are a number of key people and organizations involved in promoting and forming CUMAs in Quebec, including:

- Provincial Government Ministries and their Agents - a key figure in the development of CUMAs is Camille Morneau, who works for the Quebec Ministry of Agriculture, Fisheries and Food (MAPAQ) based in Rimouski. Morneau spearheaded the formation of the first CUMA in Quebec and Canada, the Saint-Fabien CUMA. Through his position with MAPAQ, Morneau provides hands-on assistance to producers interested in forming a CUMA, which includes: help in bringing together like-minded people interested in forming a CUMA; assistance in organizing and facilitating information meetings and membership drives; aid in identifying equipment needs and in determining feasibility; assistance in developing administrative and record keeping systems; conflict resolution and mediation.
- Agriculture and Agri-Food Canada - recently, with the financial help of Agriculture Canada, the CUMA of Saint-Cyprien developed a software program to assist in the management of CUMAs.
- Financial Institutions - Caisse Populaires have been active in providing financing to new CUMAs.
- Other Co-operatives - Co-op Federée has published several articles in their magazine "Le Coopérateur" about CUMAs.

Evolution of the CUMA Movement

Quebec has a long history of equipment sharing. As a result, the idea of co-operating to reduce farm machinery and equipment costs was not a new concept for many Quebec producers. Until 1990, the pooled ownership of equipment was most commonly done through agricultural machinery syndicate pools, a type of pool in existence in the region since the early 1970s. The CUMAs operate in a similar fashion to the machinery syndicates already familiar to many Quebec producers. However, the CUMA structure is able to address some of the shortcomings of the original machinery syndicates.

Only eight years after the formation of the first CUMA in Quebec, the number of CUMAs has grown to 47 across the province, grouping together close to 1,000

producers.[8] An additional three CUMAs are projected to incorporate within the next six months. While the majority (approximately 80 percent) of CUMAs are involved in the dairy sector, a growing number are being formed in other sectors, including hog, beef, poultry and vegetable production. Although no CUMAs have yet to be incorporated outside of agriculture, people involved in other resource-based industries, such as fisheries and forestry, are beginning to consider the CUMA model as a method of machinery and equipment sharing.

The CUMAs have provided farmers with substantial economic benefits. Morneau (1996) feels that the CUMA model of sharing farm machinery:

- improves the financial health of participating farms by sharing the financial risks and minimizing individual investments;
- ensures the most efficient use of invested capital as well as reduces operational costs;
- allows for the purchase of more efficient and powerful machinery;
- favours shorter equipment turn-over periods in order to obtain a higher resale value;
- stimulates member interest in joining the co-op by requiring a relatively low financial commitment (4 to 7% of the machine's purchase cost) and the lowest possible user fees;
- reduces labour demands since larger, more efficient machinery is used and members help one another out;
- allows producers to use machinery that is specifically suited to meeting the needs and conditions for expansion;
- encourages producers to manage available time and farm work by planning, organizing and carrying out the work in the best possible way;
- frees-up usually scarce funds that would be better applied to other areas, such as increasing herd size or production quota.
- eliminates some of the unproductive capital assets on members' farms.

Although the economic benefits of becoming involved in a CUMA are undoubtedly an important factor to the co-ops' success, CUMAs have also had an important social impact

[8] Coopérative Fédérée de Québec, 1998.

on the agricultural community. Many of the CUMA members interviewed as part of this study noted that the non-economic benefits are also a key to the success of CUMAs.

Co-operative Arrangements for Labour Sharing

Inspired by the CUMA's already in place in the region and in response to chronic agricultural labour shortages, Quebec producers have recently come up with a couple of different ways to share farm labour in addition to sharing farm machinery. The first is the addition of labour, or personnel, activity branches to already existing CUMAs. The second is the development of "CUMOs", farm labour co-operatives which hire agricultural labourers who offer their services to all the members of the co-operative.

Many of the CUMAs have evolved to share and pay employees communally through the addition of farm labour activity branches. In particular, many of the CUMAs involved in the dairy sector have milking and cow herding services as an activity branch. These activity branches operate along the same principles as the machinery branches. Members who are interested in having a hired hand help out on their farm, but who do not have enough work to justify hiring a full time labourer, get together and develop an activity branch. To join the branch, members must commit to hiring the labourer for a specific number of weeks per year. Depending on how much farm labour is required by all of the members in the branch, the CUMA then hires one or more labourers to meet the needs of the activity branch members.

Alternatively, some producers in Quebec have started to form separate farm labour co-operatives—or CUMOs, which are based on the CUMA model for sharing farm machinery. These co-operatives hire agricultural labourers who then offer their services to the members of the co-operative. The CUMOs are formed by producers who all have labour needs at some point in time, but never on a full-time basis.

To join a CUMO, members must purchase a membership share, as well as pay an annual fee. Members must also promise to utilize the co-operative's labour supply for a minimum amount of time per year. Once every 3 months, the members get together to establish a calendar and schedule of work needs. Members then book the days they need according to a predetermined choosing order.

The farm labour activity branches of the CUMAs and the CUMOs both provide similar benefits to farm labourers and producers. For the farm workers they provide stable employment, since the labour requirements are spread among all of the producer members and fixed in a legal contract. They also offer farm labourers variety and the opportunity to learn new skills, since the labourers get to work on several different types of farms in a given season. For the producer-members, these labour sharing arrangements provide greater access to a stable supply of skilled labour. They also free producer-members from being as preoccupied with labour matters, since all the administrative duties, including hiring and paying wages, are taken care of by the co-op. This freedom can allow members to focus more effort on pursuing other activities, professional or personal.

CUMAs in Saskatchewan?

The success of the CUMAs in lowering the machinery costs for the producers involved raises the questions: Can CUMAs work in Saskatchewan? Under what conditions would a CUMA structure be appropriate? And under what conditions would the more traditional models of farm machinery co-ops familiar to Saskatchewan be more appropriate?

In general, the features of CUMA co-operatives appear to be well suited in situations where some or all of the following features are present:

- some or all of the producers involved wish to share only certain machines (not an entire machinery set);
- members cannot agree on equipment selection for the entire group;
- timeliness issues are minimal—large losses in income are not sustained if machinery is not used optimally (for example, if the members are part-time farmers or operations are not time sensitive);
- members would like to begin sharing machinery gradually, starting with less-critical or expensive machines, either because they do not know each other well or they wish to limit their initial capital investment in the co-operative;

- members do not share similar production methods.

Saskatchewan-style co-operatives in which production is not pooled and only machinery is shared, appear to be well suited to situations where one or more of the following features are present:

- the members involved wish to share entire machinery sets, as opposed to individual machines;
- members wish to make production decisions independently, but share similar production methods;
- there may be a loss in income if machinery is not used optimally, but members share an "it all works out in the end" approach and feel that the benefits from sharing machinery outweigh the losses;
- members wish to share labour and want to take advantage of particular areas of expertise within the group.

Saskatchewan-style co-operatives in which returns and production is pooled as well as machinery and equipment, appear to be well suited to situations where some or all of the following features are present:

- the members involved wish to share entire machinery sets, as opposed to individual machines;
- the potential for conflict regarding machinery use is high—members face a significant loss of income if machinery is not used optimally;
- members are willing to make production decisions together as a group, democratically or by consensus;
- members wish to share labour and want to take advantage of particular areas of expertise within the group.

Critical Success Factors

Regardless of how a co-operative is organized and structured, there are a number of factors which are critical to the successful formation of any farm machinery co-operative:

- In any form of collective endeavor, the compatibility of the people involved is crucial to the success of the project.
- Before forming a co-op the economic viability of the venture needs to clearly assessed, taking into account the cost involved in transferring equipment from farm to farm and comparing the cost of possible alternatives such as leasing or custom work.
- Good communication between members is essential to minimize conflict and to make sure that benefits are obtained.
- The maintenance of accurate records and a solid bookkeeping system.
- Written agreements help members to clearly understand the workings of the co-operative and their rights and responsibilities.
- Accurately determining the machinery and equipment needs of the members and investing accordingly is critical to the success of a farm machinery co-operative.

Financial Model Results

A financial model developed for this project compares the costs of owning farm machinery as individual farmers with the costs of owning machinery as members of a farm machinery co-operative. Since the optimal size of machinery varies for an individual farm as opposed to a co-operative made up of several farms, the time required to complete operations under both scenarios is also examined.

The model considers cost and efficiency variables for selected machines and equipment typical to a Saskatchewan mixed grain farm. The variables examined include:

- Time Requirement (hours needed for farm operation)
- Fixed costs
- Operating costs
- Total Machine Costs

- Rental Costs
- Complement Costs

Cost comparisons are presented on a machine by machine basis and by comparing the overall costs associated with whole machinery sets corresponding to both a direct seeding and a conventional seeding system.

Cost Comparisons by Machine

Table 1 provides a listing of the types and size of equipment compared for both an individual farmer and a co-op member.

Table 1. Types of Machines and Equipment Compared

	Individual	Co-operative
Air Seeder, Conventional	28' - 30' Air Seeder	46'-47' Air Seeder
Air Seeder, Zero Till	28' - 30' Air Seeder	46'-47' Air Seeder
HD Cultivator	34'-35' HD Cultivator	58'-60' HD Cultivator
Harrow Packer	70' Harrow Packer	80' Harrow Packer
PTO Sprayer	60' PTO Sprayer	105' PTO Sprayer
Combine SP Conventional w/pickup	Small 190 HP	Large 280 HP
Tractor	160-179 HP 2WD	250-299 HP 4WD

Table 2 provides a summary of the total (fixed and operating) annual machinery costs per acre associated with the equipment listed in Table 1.

Table 2. Summary of Total Annual Machinery Costs by Machine

	Total Annual Machine Costs ($/Acre)	
Machine	Individual	Co-op Member
Air Seeder, Zero Till	5.47	3.35
Air Seeder, Minimum Till	4.72	2.77
HD Cultivator	1.15	0.88
Harrow Packer	1.76	0.88
PTO Sprayer (1 pass per year)	1.57	1.04
PTO Sprayer (2 passes per year)	1.09	0.84
Combine SP Conventional w/pickup	19.19	12.20
Tractor - Moderate Use*	12.49	6.91
Tractor - Heavy Use**	14.79	8.39

*Moderate Use = 300 hours annual use for the individual farmer and 600 hours annual use for the co-operative.

**Heavy Use = 400 hours annual use for the individual farmer and 800 hours annual use for the co-operative.

The results indicate that, on average, a mixed grain farmer with 1,500 cultivated acres can expect to save 34 percent in total machinery costs per acre by sharing a piece of

machinery with at least two other farms of equal size, as opposed to owning the machine individually. The savings in total machinery costs are due to the combination of lower fixed costs per hour (an average saving of 22 percent) and reduced hours required to operate the machine (an average saving of 32 percent). These savings occur even through operating costs per hour are on average 39 percent higher per machine for a co-op member. The greater operating costs are due to the selection of larger machines suitable for a combined acreage of 4,500 acres.

Key results from comparing the costs associated with the individual machines selected include:

- a saving of approximately 40 percent in total machinery costs per acre and a 37 percent gain in field efficiency from sharing either a conventional or zero till *air seeder*,
- a 24 percent saving in total machinery costs per acre from sharing a *heavy duty cultivator*, due entirely to the greater work rate associated with a larger machine;
- a 50 percent saving in total machinery costs per acre from sharing a *harrow packer*, due primarily to significant savings in fixed costs;
- a seven dollar saving in total machine costs per acre from sharing the *combine*—the combined result of saving $28 in hourly fixed costs and requiring 30 percent less time to harvest;
- a 34 percent saving in total machinery costs per acre from sharing a *PTO sprayer* which is used for only one pass per year and a 24 percent saving for a sprayer which is used for two passes a year;
- a saving of 23 percent in total machine costs per acre from sharing a *large tractor*, assuming moderate hours of use per year (300 hours of use for the individual farmer, 600 hours of use for the co-operative).
- a saving of 36 percent in total machine costs per acre from sharing a *large tractor*, assuming heavy hours of use per year (400 hours of use for the individual farmer, 800 hours of use for the co-operative).

The greater field efficiency of the drawn equipment suitable to the co-operative also translates into lower complement costs per farm for co-op members. Complement costs

include the machinery costs of both the equipment and a compatible power unit. In all cases except for the harrow packer, the complement cost per hour were higher for the co-op member due to the larger equipment and power unit required to draw the equipment. However, complement costs per farm were on average 30 percent lower for the co-op member due to the fewer hours required to complete farm operations.

It is important to note that although the number of hours of equipment use per farmer is reduced significantly through the sharing of larger equipment, the total hours of equipment use for all members of the co-operative is still larger in each case than for the individual. For example, an individually owned combine is estimated to be used for 188 hours per year. A member of a farm machinery co-op requires the co-op's combine for only 130 hours a year. However, the combined need by all co-op members is 391 hours. As a result, the need for a larger window of opportunity for all co-op members to complete certain operations must be considered and weighed against the cost savings realized through machinery sharing. In other words, the potential loss in income from not being able to use a machine at the most optimal point in time must be compared with the cost savings realized. While this is not likely to be an issue with field preparation equipment for example, it may be with seeding and harvesting operations.

A comparison of rental costs suggests that the individual farmer would be better off renting the equipment listed in Table 1 as opposed to owning it. The one exception is the *PTO sprayer* which would be more economical to own than rent if the sprayer was used more than once a year. However, in making the decision of whether to purchase or to rent a machine or piece of equipment, farmers need to consider other factors not captured in this financial model. These additional factors include the existence of rental agents nearby, the availability of required equipment and the cost of transporting the equipment to the farm.

Cost Comparisons by Machinery Set

The costs associated with owning a set of machinery typically used under a direct seeding system are compared with the costs associated with co-operatively owning the same set of

machinery. The costs associated with a set of machinery typically used under a conventional seeding system are also compared.

Key results from the comparison of machinery sets include:

- Under a *conventional seeding system* annual fixed costs are 45 percent lower and operating costs are 14 percent lower for the co-op member. As a result, total annual machinery costs are 36 percent lower for the co-op member than for the individual owner.
- The combination of lower fixed costs and lower operating costs translate into an estimated overall saving in total annual machinery costs of 33 percent for a co-op member versus an individual farmer-owner under a *direct seeding system.*

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Appendix A - The CUMA Farm Machinery Co-operatives

Appendix B - Farm Machinery Co-operatives in Saskatchewan and Quebec

Appendix C - Farm Machinery Co-operatives: An Idea Worth Sharing

The CUMA Farm Machinery Co-operatives

Andrea Harris

Murray Fulton

October 1999

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Introduction

The mechanization of agriculture, while allowing for gains in productivity, has also contributed to a large economic drain on some farmers. In response, an increasing number of farmers have looked to sharing farm machinery as an alternative to individual ownership and the associated capital burden. Farm machinery co-operatives are one example of a farm machinery sharing arrangement being considered by an increasing number of Canadian farmers.

Quebec farmers in particular have adopted the co-operative structure as a way of reducing the costs associated with operating and financing farm machinery and equipment. The particular type of machinery co-operative being adopted in Quebec is known as the CUMA, Coopérative d'Utilization de Matériel Agricole, loosely translated as "co-operative for the use of farm implements" and is based on similar co-operatives operating in France.

Unlike other types of farm machinery co-operatives in which entire machinery sets are pooled among all members, CUMAs are structured to allow the sharing of individual machines among sub-sets of members. The sharing of individual machines is facilitated through the use of activity branches and member contracts.

Since the incorporation of the first CUMA in Quebec in 1991, more than 1000 farm operations have become members of the more than 47 CUMAs established in the region.[1] An additional three CUMAs are projected to incorporate within the next six months. The successful implementation of CUMA's in Quebec has also encouraged farmers in Ontario to do the same, with 1997 marking the formation of the first CUMA in Ontario.

While the majority of the CUMAs have been formed by dairy producers interested in lowering machinery costs, the idea has inspired interest in co-operatively addressing other problems, such as the shortage of skilled farm labour. Producers involved in the hog, poultry, beef and vegetable sector are also beginning to form CUMAs. The idea has sparked interest in other industries as well, including forestry.

[1] Gouvernement du Québec, 1994

Direct economic advantages to producers from being part of a CUMA include cost savings and access to newer, more efficient equipment. According to GREPA (an economic and agricultural research group), equipment costs on Quebec dairy farms comprise about 20-25% of their total expenses. Joining a CUMA can help decrease these expenses, as well as overall production costs. Some estimates indicate that equipment and machinery costs can be lowered by nearly 70 percent for CUMA members.[2] Using shared machinery also allows for the purchase of the most up-to-date equipment, which is larger and more efficient than what individual producer could purchase alone. On-farm efficiency is therefore improved.[3]

This booklet begins with a description of the CUMA administrative and organizational structure. This is followed by an overview of the CUMA development process, including the steps involved in forming a CUMA and a discussion of who's involved in this process. The booklet ends with discussion of the evolution of the CUMA movement in Quebec and how CUMAs have sparked interest in other forms of co-operative arrangements, in particular the sharing of farm labour.

[2] Lebel, 1995.
[3] Gouvernement du Québec, 1994.

The "CUMA" Structure

Like all co-operatives, CUMAs are groups of people who have come together to satisfy common economic and social needs. The main objective behind forming a CUMA is to provide the producer members with an organization from which they can obtain services, primarily the renting of agricultural machines and equipment. This allows each individual producer to lower his or her capital investment, increase efficiency and reduce production costs.

CUMAs are incorporated associations of at least 5 members who must be agricultural producers. The incorporation of the CUMA means that it is considered an autonomous person under the law. It also means that the liability of the members is limited to the amount invested in the association.

The CUMA is the sole proprietor of all equipment and machinery and functions according to strict guidelines. The co-operative's internal rules and legally binding contracts with members clearly spell out the rights and obligations of both the CUMA and its members.

Unlike other types of farm machinery co-operatives in which entire machinery sets are pooled among all members, CUMAs are structured to allow the sharing of individual machines among sub-sets of members. The sharing of individual machines is facilitated through the use of activity branches and member contracts.

Activity Branches and Member Contracts

Two key features of the CUMA's organizational structure are the existence of activity branches and the use of member subscription contracts. To obtain the right to use the equipment and machinery owned by the CUMA, participating members must join an activity branch. Each activity branch corresponds to the use of one machine, piece of equipment or service. A minimum of 3 members per branch is recommended.

Figure 1 shows the organizational structure of a hypothetical CUMA farm machinery co-op. In this example the CUMA is organized into three activity branches. Each activity branch corresponds to a different machine or farm operation, in this case a hay baler, seed drill and forage harvester.

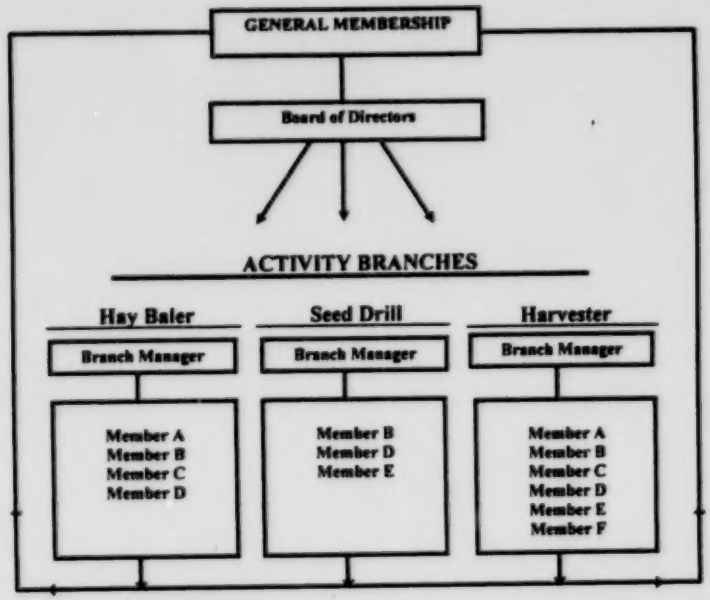

Figure 1. Organizational Structure of a CUMA

Upon joining an activity branch, each member must sign a subscription contract which commits them to using the particular piece of equipment or machine for a specific amount of time or number of units per year for the duration of the contract. The duration of the contract is typically the same length of time over which the machine is being financed (usually three to five years). A sample subscription contract is provided in Appendix A.

For example, consider a producer (member A) who joins the CUMA illustrated in Figure 1 in order to share the costs associated with a hay baler. The producer forms an activity branch with three other producers in his area who are also interested in sharing a hay baler. Each member signs a subscription contract which specifies how much he intends to use the hay baler over the next five years (the number of years for which the baler will be financed). The

CUMA then purchases a hay baler which will meet the combined needs of all of the branch members.

Financing

CUMAs are financed through three sources of capital:

- members' investment shares,
- traditional sources of debt financing, and
- members' fees.

To join an activity branch each member must purchase a certain number of investment shares which provides the CUMA with the equity capital needed to purchase the machine. Member investment shares do not receive interest and are typically used to finance 20 to 30 percent of the purchase cost of the equipment.

In most cases, member investment shares are divided equally amongst all branch users. For example, in the CUMA illustrated in Figure 1 the four members who commit to using the hay baler must each purchase shares equal to 5 percent of the cost of purchasing the baler (20 percent divided among the four members). Since the machinery cost associated with the harvester is spread among six members, each member must purchase investment shares which equal 3.3 percent of the harvester's purchase price. In a few cases, investment shares are divided among members according to their use of the machine, as specified in the subscription contract.

The remaining 70 to 80 percent of an activity branch's capital costs are covered through loans with financial institutions, such as credit unions or banks. In general CUMAs finance their machines over a three to five year period, and in rare cases over a seven year period. The period over which a machine is financed corresponds to the length of the subscription contract signed by each branch member. Financing periods are purposefully kept short in order to ensure a relatively quick turn-over in the equipment and machinery used by a CUMA's activity branches. Quick turnover rates allow members to take advantage of technological advances. High turnover also implies lower maintenance and repair costs and a higher resale value when the activity branch is terminated (i.e., members' subscription contracts expire).

In addition to paying their share of the 20 to 30 percent of the purchase cost of the equipment, members must also pay member fees on regular basis—typically four times a year or season. Member fees are used to cover the annual rent of the equipment which includes:

- the real cost of financing (capital and interest) the equipment;
- the inherent costs of using the equipment, including insurance, repair and maintenance costs, and storage costs.

A member's share of the annual rent is determined in proportion to the member's use of the equipment in the given year and the amount of use they have committed to in their subscription contract.

The annual rent is typically fixed for the year, based on projected costs. At the end of the year the annual rent is subject to adjustment in order to take into account the real costs of use. Although the CUMA tries to run its operations on a service at cost basis, a surplus can arise. Surpluses may be retained by the CUMA in reserve or returned to the members in proportion to their machinery and equipment use. If surpluses are returned, members can expect to be charged a lower member fee on their final bill for the year.

In the case that a member is unable to use the equipment as much as he has committed to in his subscription contract, he is still bound to respect the financial agreement set forth in the contract. That member will therefore still be billed for the same amount that was originally specified in the contract.

Governance

There are four types of players involved in the administration and governance of a CUMA:

- the general assembly (or membership);
- the board of directors;
- the branch manager; and
- the equipment manager.

In the example illustrated in Figure 1, six members are recruited and make up the general assembly. The board of directors is composed of members elected by the general assembly. The board oversees all the co-op's business, including all activity branches.

Each member is entitled to one vote in electing directors and in making other decisions regarding the co-operative, regardless of the number of activity branches to which they belong or the amount of money they have invested in the co-op. Voting by proxy is not allowed.

The board, based on the recommendation of the branch members, designates someone to be in charge of each activity branch. The branch manager organizes the use of the equipment or machine, including administering schedules. He or she also ensures that contractual agreements are kept, that is, members adhere to their subscription contract. In some cases a member is also chosen to be responsible for equipment care, although the tasks of branch manager and equipment manager are often combined. The equipment manager is in charge of the upkeep, delivery and repair of the equipment.

Both branch and equipment managers report to the board. Before each annual general meeting, branch managers of each activity branch hold a meeting of their members for the purpose of evaluating the season just ended. Any concerns are then taken to the board at the annual general meeting.

Administration and Scheduling

The order by which the members of an activity branch use the machines and equipment is determined through a draw held in the first year of operation, or by some other means deemed acceptable by the majority of the branch members. For example, machinery use can be allocated according to soil types or types of seed being planted.

The last user of the equipment is not bound to return it to the branch manager. However, he must advise the branch manager that he has finished using it, so that the next person in line can take her turn.

A log book accompanies each piece of equipment and machinery owned by the CUMA. Each member is obligated to enter into the log book:

- how much he or she used the equipment (for example, the number of bales, hours or acres used);
- the date and time of any breakdowns or noted anomalies
- the date, time and nature of any repairs or maintenance performed.

Members must also inform the branch manager of any breakdowns, anomalies, repairs or maintenance.

In the case of a breakdown the branch and equipment manager, together with the branch members if necessary, determin the nature and cause of the breakdown by using certain criteria, such as work overload, faulty maintenance, fault in driving, etc. With a breakdown that is not of an accidental nature the member at fault must assume the repair costs. In cases that require litigation, the board of directors decide on the action to be taken.

If a major no-fault breakdown occurs during the year and the co-operative does not have enough funds in reserve (collected from the members of that activity branch) to carry out the repair, an additional rent will be billed to the members of the branch.

CUMA - Key Features

- A CUMA rents out equipment to its members at the lowest possible cost.
- An activity branch consists of three or more members who sign a subscription contract agreeing to use the equipment for the entire period of financing.
- The subscription contract specifies the members' annual volume of work and the order of priority to be used in the case of conflicting schedules.
- One individual is appointed per activity branch to ensure that the branch is run effectively and that the contract terms are respected.
- A member who does not meet his contracted work volume will be billed on the same basis as the other members.

Reference: Richard, 1998.

Modification or Termination of an Activity Branch

If the majority of participating branch members want to change their particular piece of machinery or equipment at some point throughout an existing contract it can be sold. However, since the equipment belongs to the whole co-operative, only the board can decide whether or not to sell. Money from the sale of the equipment can be used to decrease the member fees or be put towards the purchase of the next piece of machinery. The existing subscription contracts have to be cancelled and new ones drawn up and signed by the participating branch members.

As the subscription contracts of a particular activity branch expire (i.e., when financing of the machine is complete), the participating members can choose to end the activity branch, if they

wish. Again, board approval is required before the associated machine or piece of equipment can be sold. Any profits made on the sale of the machinery are added to the co-operative's reserves. The original members of the activity branch may be entitled to a reimbursement for their share, depending on the financial particularities regarding the machine or equipment.

The CUMA Development Process

Forming a CUMA

The process involved in forming a CUMA is much the same as that involved in forming other kinds of co-operative business. In a guide developed to assist producers interested in forming a CUMA the CUMA development process is described as a 3-stage procedure.[4]

Stage 1 - Consultation

The first stage involves getting potentially interested producers together to discuss the idea of a CUMA. This stage is guided by the leadership of one or two producers who find and recruit other producers by presenting them with their ideas on sharing farm machinery and by explaining the co-operative model. Several meetings may happen before the co-op concept is well grasped by all involved. The consultation stage is completed with the election of a steering committee, whose members will form the basis of the new co-operative.

Stage 2 - Organization

In the organization stage the participating producers identify their machinery and equipment needs. Specifics such as model, type and costs are determined.

In this stage the incorporation documents are also developed and forwarded to the Cooperative Directorate within the Ministry of Industry, Business, Science and Technology (MICST) for approval. Required documents include a set of bylaws which outline the purpose of the co-operative, its capital structure, the responsibilities and rights of membership, how and when meetings will be held, and the rights and responsibilities of the board and officers of the co-operative. A sample set of bylaws is provided in Appendix B.

Step 3 - Formation

The final stage is the formation of the new CUMA. A general assembly must be called within 60 days of the signing of the incorporation documents. Once the co-operative is formed and the activity branches are created, the co-op can begin to function. Those elected to the board of directors can start purchasing the equipment and machinery.

The Human Element

As with any form of collective action, the nature and commitment of the people involved are fundamental to the successful formation of a CUMA. The "human element" is what drives and ensures the continuity of such an association. This is why those involved with the formation of CUMAs in Quebec feel that it is critical to undertake set-up procedures only with those producers who are totally ready and committed to the concept.

In a booklet about the CUMAs in Quebec, Morneau (1996) describes the human attributes necessary to ensure the success of a CUMA:

- A commitment to helping one another - not only at the level of sharing machinery, but also through a commitment to plan and organize work and to make oneself available during the peak periods of the season;
- Communication - the ability to discuss issues and bring forth any behavior or problems that could cause ill-will within an environment of mutual respect and trust;
- Discipline - a respect of the rules drawn up by the members to ensure the proper functioning of the organization;
- Co-operative spirit - helping members adjust to the co-operative method of sharing farm machinery and to reinforce solidarity, because strong individualism within the group is a potential source of conflict;

[4] Gouvernement du Québec, 1994

- Training - sharing experiences and skills among members, especially with respect to new technologies;
- Social interaction: helping to carry out the full potential of the co-operative, while keeping it a personable and of a manageable size;
- Partnership: supporting the growth and development of CUMAs, avoid isolating one CUMA from another, encouraging the expansion of inter-CUMA practices to avoid overcapitalization.

The Formation of a CUMA

The following paragraphs describe the process involved in the development of a new CUMA being formed in the Ottawais region The process was described in an interview with Solange Blé, one of the founders of the CUMA.

The first meeting was held on December 1. The purpose of the meeting was to determine whether there were other people interested in forming a CUMA in the area. The agenda included having three members from another CUMA in the area share their experiences and describe how their co-op works. Twenty-five people showed up (23 were already part of the dairy management syndicate for the area). Only two people were not interested in joining (they already had their own equipment already and therefore didn't really see the need).

By the end of the meeting it was decided to go ahead with the project. Six people were appointed to a steering committee, which was put in charge of incorporating the co-op, organizing future meetings, and facilitating the formation of activity branches.

Two weeks later a second meeting was held. This time members from a CUMA in Trois Riveries were invited. The group had to cover the members' travel costs and the costs of their replacement milkers. The MAPAQ (Quebec Ministry of Agriculture, Fisheries and Food) regional office donated $300 to offset the costs of bringing the members in and the group intends to recover the remaining costs through future membership fees.

The first general meeting was scheduled for March 1. This is when members were asked to sign up and invest. Members were also asked to pay $20 to join the CUMA, and to offset start-up costs.

In the meantime the steering committee met at least four times to complete the incorporation documents for the co-op. The sample incorporation documents, available through the Ministry of Industry, Commerce, Science and Technology, have been very useful in this regard. The group also benefited from hands-on assistance provided by the local MAPAQ representative and from being able to contact Camille Morneau (with MAPAQ in Rimouski) by phone and e-mail.

Once the group receives the necessary government approval, they will be ready to start their CUMA, with one activity branch all set to go. It's a seeding branch which will serve five members within 30 kms of each other. The CUMA will likely have other seeding branches to serve groups of members in different geographic areas, since the furthest distance between the members of the CUMA is 80 kms.

Blé explains that if they could do things over again they would probably have started earlier. But so far things have worked very smoothly and the group feels fortunate with the support it has received to date.

Who's involved?

Although the central players in the development of a CUMA are undoubtedly the producer-members themselves, there are a number of key people and organizations involved in promoting and forming CUMAs in Quebec. These people provide several different forms of assistance to those producers interested in the development of the CUMA machinery co-operatives.

Provincial Government Ministries and their Agents

The provincial government currently provides significant support to the development of CUMAs in the province. A key figure in this development is Camille Morneau, who works for the Quebec Ministry of Agriculture, Fisheries and Food (MAPAQ) based in Rimouski. Morneau first read about the CUMAs in France as part of his masters thesis at the University of Quebec. In 1991, after studying the model and visiting CUMAs in France, Morneau spearheaded the formation of the first CUMA in Quebec and Canada, the Saint-Fabien CUMA.

In conjunction with the Quebec Ministry of Industry, Commerce, Science and Technology, Morneau was involved in the development of a guidebook which gives producers an overview of the steps necessary in forming a CUMA and provides them with sample incorporation documents. Through his position with MAPAQ, Morneau provides hands-on assistance to producers interested in forming a CUMA, which includes:

- help in bringing together like-minded people interested in forming a CUMA;
- assistance in organizing and facilitating information meetings and membership drives;
- aid in identifying equipment needs and in determining feasibility;
- assistance in developing administrative and record keeping systems.

Morneau has also been providing training and information to other ministry representatives so they can provide similar assistance to producers in their respective regions.

Assistance is not only available during the formation stages of a CUMA. An important service that Morneau is beginning to provide more and more of is conflict resolution. Many of the CUMA members interviewed cited this as a critical service to their ongoing success, as it enables them to draw on the experiences of other CUMAs and realize that their conflicts can be resolved. Morneau has worked directly with producers to resolve conflicts, but he has also arranged conflict resolution workshops for CUMA members. The provincial government has largely sponsored these workshops.

Agriculture and Agri-Food Canada

Recently, with the financial help of Agriculture Canada, the CUMA of Saint-Cyprien developed a software program to assist in the management of CUMAs. The program facilitates the complex CUMA accounting system, which includes equipment accounting and billing to each user member. This program was handed to each CUMA free of charge and is in use by at least 12 co-ops.[5]

Financial Institutions

Caisse Populaires have been active in providing financing to new CUMAs. Like the provincial government, the Caisse Populaires were reluctant at first to finance the new co-operatives. However, once the first few CUMAs were established, and the Caisses representatives better understood the model, financing became easier. The CUMA model is now accepted by the Caisses Populaires as a low risk method of financing the machinery needs of farmers—the risk of having a group of farmers default on their loan payments is much lower than the risk of a single farmer defaulting on his loan during a bad year.

Other Co-operatives

Co-op Federée has published several articles in their magazine "Le Coopérateur" about CUMAs. The magazine is widely distributed throughout rural Quebec. Co-op Federée also offers board training and other education programs to CUMAs at the same rate offered to Co-op Federée members.

[5] Lebel, 1995.

Keys to the Success of CUMAs in Quebec

The popularity of the CUMA model in Quebec, represented by the rapid adoption of this model throughout the province, provides a clear indication that these co-operatives are meeting the needs of their members. Based on interviews with CUMA members, a number of hypotheses can be made as to possible reasons for the success and popularity of the CUMA machinery co-ops in Quebec. They can be summarized as follows:

- Direct economic gains to individual producer-members;
- Previous experience with co-operatives and other farm machinery arrangements;
- Clearly defined organizational structure and limited personal liability;
- Substantial support from various external organizations, including governments;
- Community development gains and the "human factor".

Evolution of the CUMA Movement

Pre-CUMA Machinery Syndicates

Quebec has a long history of equipment sharing. As a result the idea of co-operating to reduce farm machinery and equipment costs was not a new concept for many Quebec producers. Until 1990, the pooled ownership of equipment was most commonly done through agricultural machinery syndicate pools, a type of pool in existence in the region since the early 1970s.

Although the syndicate approach to pooling property had advantages, it also had its disadvantages. Advantages included the ease with which such syndicates could be set-up, since they had no legal status and therefore do not involve time lags such as those associated with the incorporation process.

One of the main disadvantages associated with the machinery syndicates was the difficulties associated with arriving at unanimous decisions, and hence the threat of having members break their agreements within the pool. Because the equipment did not belong to an enterprise, but was part of an agreement, the consent of all parties to the original agreement was required to modify the agreement. If a member left the pool, his share in the equipment at the time of departure had to be assessed, or sold outright, so as to be sure of its true market value.

A second and increasingly serious irritant with the machinery syndicate model was the fact that each member had to personally sign for the pool's debts. For instance, if the pool bought equipment for which it took out a loan of $100,000, each member (say there were five) would need to sign a personal guarantee for the full amount of the loan.[6]

The CUMAs operate in a similar fashion to the machinery syndicates already familiar to many Quebec producers. However, the CUMA structure is better able to address the two syndicate shortcomings described above. First, the machinery is owned by the CUMA and members are bound to using the equipment through legally binding contracts, thereby eliminating the difficulties around having members break the informal syndicate agreements. Second, the liability of members of a CUMA is limited to their initial share investment and personal guarantees are not required.

CUMA Movement At A Glance

- 48 CUMAs - 47 in Quebec and 1 in Ontario.
- Close to 1,000 farms participating in over 230 branches of activity.
- Average of 18 members per CUMA.
- Have raised in total over $3 million dollars.
- 60 different types of machines and equipment.
- Predominantly young producers involved (average age in 1997 was 37)

Reference: Morneau, 1996.

Introduction of CUMAs to Quebec

As was mentioned previously, a key figure in the development of CUMAs in Quebec is Camille Morneau with the Quebec Ministry of Agriculture, Fisheries and Food (MAPAQ). Morneau first read about the CUMAs in France as part of his masters thesis at the University of Quebec. The French CUMAs have their roots in de Gaulle's first post-war cabinet which supported the creation of

[6] Richard, 1998.

co-operatives to encourage the collective purchase and use of scarce farm equipment in the immediate years after the second world war.[7] Although the rationing of tractors and other farm equipment has long ended, there are still close to 13,000 CUMAs in France, representing approximately 400,000 members.[8]

After studying the model and visiting CUMAs in France, Morneau decided to try to apply the model to Quebec. This decision led to the formation of the St. Fabien CUMA. Morneau describes the development of the first CUMA as a very delicate process. He knew that the success of the first CUMA would be watched closely, with many outside producers and government bureaucrats believing that such an arrangement would never work.

However, once the first few CUMAs were up and running other producers quickly became interested in the idea and the Quebec government began to support their development. As a result Morneau's position with the ministry of agriculture has evolved to enable him to provide hands-on assistance on a full time basis to producer groups involved in forming a CUMA.

Growth of CUMAs

Since its incorporation, the Saint-Fabien CUMA has become an example to producers in other regions. Indeed, only eight years later, the number of CUMAs has grown to 47 across the province, grouping together close to 1,000 producers.[9] An additional three CUMAs are projected to incorporate within the next six months.

While the majority (approximately 80 percent) of CUMAs are involved in the dairy sector, a growing number are being formed in other sectors, including hog, beef, poultry and vegetable production. Although no CUMAs have yet to be incorporated outside of agriculture, people involved in other resource-based industries, such as fisheries and forestry, are beginning to consider the CUMA model as a method of machinery and equipment sharing.

CUMAs have not only grown in numbers, but also in size. Table 1 is from a study prepared by Morneau which documents the evolution of CUMAs in Eastern Quebec from 1991 to 1996.

[7] Raup, 1975.
[8] Lebel, 1995.
[9] Coopérative Fédérée de Québec, 1998.

Morneau notes that in 1991 the fixed assets per CUMA were $30,900, compared with $57,454 in 1996. During this same period, membership increased nearly tenfold, with the average number of members going from 10 to 17. As a result of the increased number of members, fixed assets per member have remained fairly constant over the same 5 year period—in 1991 fixed assets per member were $3,196 compared to $3,392 in 1996.

Table 1. Evolution of CUMAs in Eastern Quebec, 1991-1996

Year	1991	1996
Number of CUMAs	3	15
Number of Members	29	254
Number of Activity Branches	10	86
Assets - Purchase Price ($)	92,704	861,815

Source: Morneau, 1996.

The Leclercville CUMA is a typical example of CUMA growth. The CUMA was officially founded in July of 1994. At its inception the CUMA had five members and no assets. One year later, the CUMA owned $35,000 worth of machinery which was organized into two branches. The number of members had climbed to 12.

By 1998, the Leclercville CUMA had 22 members, 16 machinery branches, with $150,000 worth of equipment. The co-op also has a personnel branch which hires out replacement employees to CUMA members wishing to be temporarily absent form their operation (this type of arrangement is discussed in further detail at the end of this section).

Economic Impact

The CUMAs have provided farmers with substantial economic benefits. Morneau (1996) feels that the CUMA model of sharing farm machinery:

- improves the financial health of participating farms by sharing the financial risks and minimizing individual investments;
- ensures the most efficient use of invested capital as well as reduces operational costs;
- allows for the purchase of more efficient and powerful machinery;

- favours shorter equipment turn-over periods in order to obtain a higher resale value;
- stimulates member interest in joining the co-op by requiring a relatively low financial commitment (4 to 7% of the machine's purchase cost) and the lowest possible user fees;
- reduces labour demands since larger, more efficient machinery is used and members help one another out;
- allows producers to use machinery that is specifically suited to meeting the needs and conditions for expansion;
- encourages producers to manage available time and farm work by planning, organizing and carrying out the work in the best possible way;
- frees-up usually scarce funds that would be better applied to other areas, such as increasing herd size or production quota.
- eliminates some of the unproductive capital assets on members' farms.

Table 2. Machinery Costs for CUMA Member - 1994

Machine/Equipment	Purchase Price ($)	Yearly Member Fee for Use ($)
Seeder	9,300	460
Rake	7,000	340
Rock Picker	14,500	560
Forage Harvester	24,000	1160
Chemical Sprayer	8,500	140
Liquid Manure Spreader	14,500	360
Solid Manure Spreader	10,000	670
Pressure Washer	2,300	70
Wood Saw	1,400	30
Grader	1,700	110
Total	93,200	4,340

Adapted from Morneau, 1996.

To provide people with an example of the direct economic advantages of CUMA membership, Morneau documented the 1994 machinery costs of a CUMA member. The producer owns and operates a 90 cow dairy farm and is self-sufficient in grain and alfalfa production. Table 2 illustrates the type of machinery pooled by the member through the CUMA, the purchase price of the machinery as well as the total cost to the member of using this machinery for the year. The total cost per machine reflects the member fees based on the units of machinery used and billed to the member by the CUMA. The member fees include the cost of financing the machinery, insurance, storage and maintenance.

Taking the seeder as an example, the producer uses the machine to seed 70.40 acres. He is charged $6.53 per acre by the CUMA to cover the associated financing, insurance, storage, and maintenance costs. The total cost of using the seeder is therefore $460 for the year.

Table 3. Comparative Costs for Individual Farmer - 1994

Financing Cost (10 Year Loan)	13,920
Insurance	374
Storage	500
Maintenance	300
Total	$ 15,094

Source: Morneau, 1996.

Table 3 lists the machinery costs associated with machinery set illustrated in Table 2 (with a total purchase price of $93,200) assuming individual ownership. Under this scenario the individual operator would be paying $15,094 per year to cover the financing, insurance, storage and maintenance costs. When compared with the CUMA member's annual fees for the same machinery set, the CUMA member is spending 70 percent less on equipment than the farmer who owns the same equipment independently.

Social Impact

Although the economic benefits of becoming involved in a CUMA are undoubtedly an important factor to the co-ops' success, CUMAs have also had an important social impact on the agricultural community. Many of the CUMA members interviewed as part of this study noted that the non-economic benefits are also a key to the success of CUMAs. Camille Morneau sums this sentiment up by saying:

> *"The social aspect of a co-operative is an integral part of its overall success, and in this way differs from other types of machinery sharing syndicates. Co-ops are much more than just an efficient way of purchasing machinery...they allow people to meet one another, to work together, to share one's experiences and skills. It helps re-validate the agricultural producer. Although members of a co-operative initially join up for economic reasons, they also want to re-instill basic rural values with their neighbours, such as co-operation and helping one another."*[10]

Given the strong sense of community with accompanies the CUMAs, it is not surprising to note the high level of participation. According to Morneau, there is approximately an 85% member turnout at all CUMA general assemblies—at the recent general Assembly of the Saint-Fabien co-operative, 29 of the 33 members were present.

Assembly of CUMAs

Accompanying the development of an ever greater number of CUMAs has been the formation of a loose association of CUMAs. The primary purpose of the association is an annual assembly of CUMA members from across Quebec and Ontario. The annual meetings serve to:

- develop bonds between the various CUMAs and their members;
- share experiences around the development of CUMAs;

[10] Lebel, 1995.

- discuss subjects of common interest such as taxes, financing, accounting methods, and conflict resolution;
- bring forth ideas to aid in the development of existing and new CUMAs.

Sharing Farm Labour

Substantial investment in farm machinery is not the only challenge facing farmers in rural Québec, or for that matter, in the rest of Canada. It has become increasingly difficult for many farmers to hire additional seasonal labour during busy periods, to complete specific projects or to deal with unplanned family events. In many regions of Quebec, trying to persuade skilled people to help out just "once in a while" is nearly impossible.

Inspired by the CUMA model of sharing farm machinery, Quebec producers have recently come up with a couple of different ways to deal with shortage of skilled, certified agricultural labour. The first is the addition of labour, or personnel, activity branches to already existing CUMAs. The second is the development of "CUMOs", farm labour co-operatives which hire agricultural labourers who offer their services to all the members of the co-operative.

Farm Labour Activity Branches

In addition to sharing farm machinery and equipment, many of the CUMAs have evolved to share and pay employees communally through the addition of farm labour activity branches. In particular, many of the CUMAs involved in the dairy sector have milking and cow herding services as an activity branch. These activity branches operate along the same principles as the machinery branches.

Members who are interested in having a hired hand help out on their farm, but who do not have enough work to justify hiring a full time labourer, get together and develop an activity branch. To join the branch, members must commit to hiring the labourer for a specific number of weeks per year. Depending on how much farm labour is required by all of the members in the branch, the CUMA then hires one or more labourers to meet the needs of the activity branch members.

For example, one of the CUMAs hires a labourer every year to meet the needs of seven members belonging to the farm labour activity branch of the CUMA. The members of the branch meet every three months to discuss their labour needs and to develop a schedule. The schedule is submitted to the Board of Directors and the hired labourer then goes from farm to farm, in much the same way as any other activity branch would function.

For the members, sharing labour through their CUMA allows for greater access to a stable supply of skilled labour. It has also enabled many producers to comfortably leave their farm for certain periods (to take holidays for example)—something which few were able to do before joining the CUMA. The CUMA also undertakes all the hiring and administrative duties. For the farm worker, the CUMA provides stability as the labour requirements are spread among a number of producers and employment is guaranteed through a legally binding contract.

CUMOs - Farm Labour Co-operatives

Inspired by the CUMA's already in place in the region and in response to chronic agricultural labour shortages, producers in Quebec have started to form farm labour co-operatives—or CUMOs. These co-operatives hire agricultural labourers who then offer their services to the members of the co-operative. They are developed by producers who all have labour needs at some point in time, but never on a full-time basis.

To join a CUMO, members must purchase a membership share, as well as pay an annual fee. Members must also promise to utilize the co-operative's labour supply for a minimum amount of time per year.

Once every 3 months, the members get together to establish a calendar and schedule of work needs. Members then book the days they need according to a predetermined choosing order. For example, if you are able to pick the dates first this time, then next time you will be able to pick the dates last. These meetings require that each producer plan his or her labour needs very carefully, in order to take full advantage of the labour set aside for his or her use.

The CUMO is in charge of paying the labourers and undertaking associated administrative duties, including providing technical support and training the labourers.

As with the farm labour activity branches of the CUMAs, the CUMOs provide farm workers with stable employment, as the labour requirements are spread among all of the producer members and fixed in a legal contract. They also offer farm labourers variety

and the opportunity to learn new skills, since they work on several different types of farms in a given season.

For the producer-members, CUMOs provide greater access to a stable supply of skilled labour. They also free producer-members from being as preoccupied with labour matters, since all the administrative duties, including hiring and paying wages, are taken care of by the co-op. This freedom can allow members to focus more effort on pursuing other activities, professional or personal.

La Mosaique Farm Labour Co-operative

In the spring of 1996, several producers from the Lotbinière region in Quebec started up "La Mosaique", a farm labour co-operative. Inspired by the CUMA's already in place in the region, the co-operative was developed by producers who all have labour needs at some point in time, but never on a full-time basis.

La Mosaique was organized with the help of various organizations and contributors. The group received $26,000 from the Labour Development Society of Quebec, which has a mandate to support projects which help maintain and stabilize the agricultural workforce. Municipalities, caisses populaires (credit unions), and other co-ops gave support in other ways, including lending facilities to the Co-op and providing expertise in the hiring of agricultural labourers. The CUMA of Lotbinière contributed by offering its expertise in co-operative development, based on five years of operation.

La Mosaique now has 11 producer members. To become a member, one has to agree to purchase a membership share of $100, as well as pay an annual fee of $150. Members must also promise to utilize the co-operative's labour supply for a minimum of 80 hours per year. For those who cannot meet the 80 hour annual labour demands, the annual fee goes down to $50 per year with an agreement to use 80 labour hours per every 2 years.

The Co-op is in charge of paying the labourers and performing associated administrative duties, including providing technical support and training. It is also in charge of developing a pool of labour and hiring young workers for the seasonal summer work. The Co-op's labour pool is capable of meeting a very diverse range of labour needs, including fruit and vegetable picking, haying, milking, and pig farm work.

Adapted from "Une mosaique de services agricoles dans Lotbinière" by Colette Lebel, in *Le Cooperateur*, February, 1997.

Appendix A - Sample Subscription Contract

Subscription Contract

Activity Branch: *name of activity branch*

Between

_____

(hereafter referred to as "the member")

and

name of CUMA, based in *town and province*,
represented here by

_____

and

_____

who are duly authorized to sign on behalf of the cooperative.

Preamble

Whereas the cooperative will provide equipment to the member under the best possible conditions;

Whereas the cooperative will provide assistance to the member in using the equipment;

Whereas the cooperative will give to the member some power of decision within the organization;

Whereas the cooperative will provide the member with the opportunity to exercise his influence over the cost of the use of the equipment;

Whereas the member will learn and respect the rules and principles of the cooperative;

Whereas the member will maintain the equipment in good condition until this contract expires;

Whereas the member has already subscribed to the cooperative and paid for his qualifying shares;

Whereas the member will respect the decisions of the assembly and of the board of directors;

Whereas the member will attend general assemblies or justify his absence;

Both parties agree to the following:

1. **The preamble forms an integral part of the present contract.**

2. **General Goal:**

   The general goal of this contract is to make available to the member the equipment itemized in article 3 of this contract, and for which the member will have to pay the cooperative his share of the payments, expenses and costs related to this equipment; the cooperative having fully disclosed to the member user the inherent charges of the equipment, and without restraining this preceding generality, the cost of financing (capital and interest), insurance, costs of repair and maintenance, etc.

   In addition, the member must pay each year, if the case arises, his share of any deficit that the coop has generated relating to the equipment listed in article 3.

3. **Description of the shared equipment**

This contract concerns the right of use provided by the cooperative of the following equipment:

-name of the equipment: _____

-brand / make: _____

-model: _____

-serial number: _____

-acquisition date: _____

The acquisition cost of this equipment is _____ dollars ($), including all the inherent costs such as taxes, transport and preparation.

4. Financial engagement by the member

4.1 The member agrees to subscribe and to pay cash at the time of the signing of this contract, his share of the twenty percent (20%) of the purchase cost of the equipment, his share being determined by the division of twenty percent (20%) of the purchase cost by the number of members of the activity branch which uses the equipment listed in article 3.

4.2 The member agrees to pay each year his share of the annual rent fixed for the first year at $_____, his share of this rent being determined in proportion to the number of _____for the year in question. The annual rent is calculated from the following costs:

i) the real cost of financing (capital and interest) the equipment which will be financed at eighty percent (80%) of the purchase cost and amortized over a period of _____ years.

ii) the inherent costs of the equipment, including notably, but not exclusively, insurance, costs of repairs, costs of maintenance, costs of storage, and all the costs associated with property rights.

The annual rent is subject to adjustment at the end of each year in order to take into account the real costs of use and the real number of _____ done.

In addition, the annual rent is fixed each year in order to take into account variations in the costs of items which the rent comprises.

4.3 An additional rent will be billed to the members if a major breakdown occurs during the year and the cooperative does not have enough funds in reserve, collected from the members of this activity branch, to carry out the repair.

4.4 The annual rent is payable in one or several installments, according to the decision of the cooperative. The cooperative will thus send out one or several bills to the member depending on this decision. The member must pay his bill(s) within 30 days of receipt.

5. Use of equipment

5.1 The member enters into this contract to use the _____ for a minimum number of _____. Each year, the member intends to use the equipment for the following minimum number of _____ each year:

Year 1 _____
Year 2 _____
Year 3 _____
Year 4 _____
Year 5 _____
Year 6 _____ (if necessary)
Year 7 _____ (if necessary)

5.2 The member may withdraw from the activity branch at the end of the contract. He must inform the secretary of the board of directors in writing three (3) months be fore the

date o f expiry o f the contract o f his intention to withdraw; the other members of this activity branch (article 3) have the right of priority to buy the qualifying shares of the member that withdraws.

5.3 In the case that the member is unable to do as many _____ that he has set forth in his contract, he is still bound to respect the financial agreement set forth in this contract.

6. Organization of work

6.1 The cooperative's board of directors must name a member responsible for the equipment. This person must see to the maintenance, storage and repair of the equipment, and is referred to as the caretaker.

6.2 The members of this activity branch must name a person responsible for the branch. This person will define the turn each member will take in the use of the equipment, and may be the same person named by the board of directors. This person is referred to as the branch leader.

6.3 A log book which will serve in accounting for the number of _____ done will always accompany the equipment. Each member has the obligation to enter into the log, the real number of _____ done.

6.4 The last user of the equipment is not bound to return it to the caretaker. However, he must then advise the caretaker that he has finished using it.

6.5 Any noted anomalies, that occur during or after use, as well as any breakdowns, repairs or maintenance performed must be recorded in the log book, as well as the date and time that they occurred, and the caretaker must be notified.

6.6 In the case of a breakdown, be it intentional or by negligence, the caretaker, together with the branch members if necessary, will determine the nature and cause of the breakdown by using certain criteria: work overload, faulty maintenance, fault in driving etc.

- Any breakdown, if not of an accidental nature will be attributed to the member at fault. In this case, he must assume the costs of repair.
- In cases that require litigation, the board of directors will decide on the action to be taken.

6.7 The members are not entitled to claim compensation from the cooperative if the work using the equipment has been delayed due to poor weather or to breakdown to the equipment.

6.8 The board of directors may decide to halt use of the equipment if the work to be done is deemed to be damaging to the equipment.

7. Use turn

The turns of use will be determined by random drawing, type of soil, type of seeding, or another appropriate method.

The list of members of this activity branch and their use turns will be appended to each subscription contract of this activity branch.

8. Exclusivity

The _____ (article 3) is for the exclusive use of members of this activity branch. It is forbidden to lend or rent the equipment.

I confirm that I have read all clauses of this contract, and agree to respect them.

In testimony whereof, I sign at _____,
this _____ day of the month of _____,
19____.

Member _____

Name of CUMA _____

Appendix B - Sample Bylaws

BY-LAWS

FOR THE *Name of CUMA*

CHAPTER I: DEFINITIONS

1.1 Definitions

In the present by-laws, the following expressions mean:

a) The Co-operative: *Name of CUMA*

b) The Law: *Name of Act*

c) The Board: The co-operative board of directors

d) The By-laws: The co-operative internal governing by-laws

e) The Member: A person or an agricultural producer company who joins an activity branch of the co-operative.

f) The Associate Member: A person or company that has an interest as a co-operative service user and who belongs to an activity branch of the co-operative.

g) The Auxiliary Member: A person or company that has an interest as a co-operative service user and who is waiting to join an activity branch.

h) The Activity Branch: A common usage unit for materials or services for which the member signs an agreement contract with the co-operative.

CHAPTER II: CAPITAL

(Reference: article _____ of the law)

2.1 Qualifying Share

To become a member, a person must subscribe one qualifying share for the price of ten dollars ($10) each.

2.2 Terms of Payment

The qualifying share is payable by cash or cheque when admitted as a member;

2.3 Common Shares Transfer

The common shares can only be transferred with the approval of the board following written request by the assignor.

The transfer of common shares is simply done by registering in the logbook or in the member's file.

2.4 Reimbursements of Common Shares

Subject to restrictions mentioned under article 38 of the law, the reimbursement of common shares is done according to the following priorities:

a) death of the member;
b) resignation;
c) exclusions;
d) reimbursement of common shares other than qualifying shares.

The reimbursement will be done according to the chronological order o f the requests within each priority mentioned above.

CHAPTER III: THE MEMBERS

(Reference: article _____of the law)

3.1 Entrance Requirement as a Member

To become a member of the cooperative, a person must:

a) Buy the minimum number of shares as stipulated under article 2.1 of the regulation and must pay in accordance with article 2.2.

b) Be in conformity with the dispositions of article 200 of the law and sign an agreement contract for each branch of activity he/she joins.

3.2 Entrance Requirements for an Associated Member

To become an associated member of the cooperative, a person or company must:

a) Buy the minimum amount of shares as stipulated under article 2.1 of the regulation and must pay in accordance with article 2.2.

b) Be in conformity with the dispositions of article 211.1 of the law and sign an agreement contract for each branch of activity he/she joins.

3.3 The Rights of the Associated Member

The associated member is eligible for the position of director, he/she is entitled to the patronage dividend and has the right to vote in the proportion as stipulated under article 211.4 of the law.

3.4 Entrance Requirements for an Auxiliary Member

To become an auxiliary member of the cooperative, a person or company must:

a) Buy the minimum amount of shares as stipulated under article 2.1 of the regulation and must pay in accordance with article 2.2.

b) Be in conformity with the dispositions of article ____ of the law excluding the first paragraph.

3.5 The Rights of the Auxiliary Member

a) The auxiliary member is invited to attend the cooperative assemblies, he/she has the right to assist and to speak out.

b) The auxiliary member is not entitled to the patronage dividend.

c) The status of the auxiliary member can be lost by his/her resignation, his/her admission as a member or associated member or his/her exclusion by the council for the motives, and according to the procedure, stipulated under article 57 and 58 of the law.

CHAPTER IV: GENERAL ASSEMBLY

(Reference: article _____ of the law)

4.1 General Assembly

All general assemblies are held at the location, date and time established by the board subject to articles _____ of the law.

4.2 Quorum

The quorum of a general meeting is reached when 3 board members and 3 non-board members are present.

4.3 Notice of Meeting

The notice of an annual general meeting is given by mail at least seven (7) days before the date of the meeting.

The decisions taken during a general assembly can not be canceled under the pretext that members did not receive or read the notice of meeting.

4.4 Vote

The vote is taken from the floor unless it has been decided otherwise by the assembly after the request of at least one of the members present.

CHAPTER V: BOARD OF DIRECTORS

(Reference: article _____ of the law)

5.1 Composition

The board is composed of five (5) directors.

5.2 Duration of the Term

The duration of the term of the directors is three (3) years.

5.2.1 Mode of Rotation of the Directors

a) However, for the first three (3) years of the cooperative foundation, the duration of the directors' mandate is as follows:

one (1) seat will be up for election after the first year, two (2) seats after the second year and the other two (2) seats after the third year;

b) There will be a random draw to determine the seats up for election after the first and second year.

c) The directors elected will then have a mandate of three (3) years.

5.3 Board Meeting

The board of directors meets as often as the interests of the cooperative requires.

The convocation is given by phone at least three (3) days before the meeting date.

For an emergency meeting, the convocation delay is, by exception, reduced to three (3) hours.

All acts passed or any resolution adopted at any board assembly are considered regular and valid even though it is discovered after that the nomination of an director is irregular or that one administrator is no longer able to sit.

The majority of the directors must be present to constitute a valid meeting.

5.4 Eligibility

To be eligible to the position of director, a member must be a fully-paid up member.

5.5 Nomination and Election Procedures for the Directors

The president and the secretary of the cooperative are chairman and election secretary unless they are themselves trying to get elected.

a) The assembly nominates two election scrutineers and, if applicable, a chairman and an election secretary.

   By accepting this position, these persons also agree not to be a candidate.

b) The election chairman reads the name of the directors whose mandate is over.

c) He then informs the assembly of the following points:

1. The directors whose mandate are finished are eligible for reelection.

2. The members can submit as many candidates as they want.

3. The nomination of candidates are closed upon proposition duly supported and uncontested.

4. The president ensures the acceptance of each candidate upon the candidate's nomination. Any refusal automatically eliminates the candidate.

5. After this elimination, if there are more candidates than seats, there is an election. If the number of candidates is equal to the number of seats, the candidates are elected by acclamation.

6. If there is an election, it is done by secret ballot. Each member receives a ballot and writes the name of the candidate of his choice. The number of names on the ballot must correspond to the number of seats available.

7. The scrutineers count the votes obtained for each candidate and report the results to the election chairman.

8. The chairman announces the candidate elected for each seat without revealing the number of votes obtained for each candidate.

9. In case of a tie for the last seat, there is another vote only between the candidates that tied.

10. If after a second vote there is still a tie, the candidate is chosen by random draw.

11. There is a recount if at least a third of the members present request one. In this case, the

candidates involved are present during the recount.

12. The ballots are destroyed by the election secretary immediately after the election is concluded.

13. Any decision by the chairman regarding the procedure has to be followed unless the assembly votes by a majority to reverse the decision.

CHAPTER VI: OFFICERS OF THE CO-OPERATIVE

(Reference: articles _____ of the law)

6.1 Role of the President

a) He/she is responsible for the presidency of the general assemblies and the board meetings.

b) He/she makes sure the regulations are followed

c) He/she supervises the execution of the decisions taken at the general assembly and at the board of directors meeting.

d) He/she represents the cooperative during relations with outside resources.

6.2 Role of the vice-president

a) He/she replaces the president in case he/she is absent or incapacitated by using his/her powers and assuming his obligations.

b) In case the president and the vice-president are absent, the assembly chooses a president among the directors that are present at the assembly.

6.3 Role of the Secretary

a) He/she is responsible for the writing of the general assembly minutes and the board meetings.

b) He/she is responsible for keeping the logbook and the archives o f the cooperative.

c) He/she writes the notices of meeting for the general assemblies and the board meetings.

d) He/she is nominated secretary of the board and passes on to various organizations whatever is required by law.

e) He/she carries on any duties inherent to his/her position.

6.4 Role of the Treasurer

a) He/she is responsible for the financial business of the coop.

b) He/she organizes the bookkeeping work and makes sure that the tasks are carried out.

c) He/she is in charge of the portfolio, the funds and the book of account.

d) He/she ensures that all shares and any other amount is paid according to the rules and other agreements from the members and auxiliary members.

e) In the three months following the end of each fiscal year, he/she must see to the preparation of the annual report as stated under article 32 of the law, he/she must collaborate with the auditor and submit the annual report to the council for approval.

f) He/she must produce, when requested, a financial report to the council.

CHAPTER VII: ACTIVITIES
(Reference: article _____of the law)

7.1 Fiscal Year

The fiscal year starts on January 1 of each year and ends on December 31.

7.2 Effective Date

The present regulation becomes effective on October 15, 1998.

_____ _____

Date Secretary of the co-operative

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Farm Machinery Co-operatives in Saskatchewan and Quebec

Andrea Harris

Murray Fulton

October 1999

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Forward

Farm machinery is becoming more expensive to purchase and own. The high cost of farm machinery is making it difficult for smaller farm operations in Saskatchewan to remain economically viable, to replace major machinery, and to access new farming technologies which require large investments in machinery and equipment. For example, the movement towards direct seeding requires purchasing specially adapted equipment and substantial capital investment in new farm machinery.

The combination of increasing machinery costs and the need for continued technological innovation has motivated many farmers to examine new arrangements to share equipment in order to reduce machinery costs and release limited capital for other uses. One such arrangement which has been used successfully is the development of machinery co-operatives.

Farm machinery co-operatives not only lower machinery costs per farm members but also enable farmers to operate machinery more efficiently since larger equipment can be purchased. Because of the larger equipment, the number of hours needed to farm the land are also reduced, allowing the farmers involved to have more time either to earn additional income or to have more leisure time.

This is one of a series of three booklets which document the results of a study which examines the applicability of different types of farm machinery co-operatives to Saskatchewan agriculture. This booklet describes the structure and organization of farm machinery co-operatives operating in Saskatchewan and a type of farm machinery co-operative known as the CUMA which has been used by farmers in Quebec and Ontario. Some guidelines and considerations in forming a suocessful farm machinery co-operatives are also discussed.

The information presented is based on extensive interviews with members of co-operatives and others involved in the development of farm machinery co-operatives. A number of the co-operatives studied are featured as case studies within the booklet.

A second booklet "*The CUMA Farm Machinery Co-operatives*" describes the CUMA co-operatives, their growth, and their development process in greater detail. A third booklet "*Farm Machinery Co-operatives - An Idea Worth Sharing*" documents the results of a simple financial model developed to compare the costs of owning machinery as an individual versus the costs of owning machinery as a member of a co-operative. The model is based on a mixed grain farm in Saskatchewan.

Acknowledgement

The authors wish to thank the many people involved in farm machinery co-operatives in Saskatchewan, Quebec and Ontario who were interviewed as part of this project. Without their insight and openness in sharing information this research could not have been completed.

This booklet and research project were funded by the Agricultural Development Fund of Saskatchewan.

Farm Machinery Co-operatives - The Basics

What is a Co-operative?

A co-operative is a type of business which is formed by people who share a common goal and who are willing to work together to meet this goal. Virtually any type of business can be organized as a co-operative. Indeed, co-operatives operate in almost every sector of the Canadian economy, including financial, retail, housing, forestry, fisheries and agriculture.

Co-operative businesses share the following key features:

- they exist to meet the needs of their members–the people who use the services provided by the co-op;
- they are owned by their members and rely on member investment to meet the bulk of their capital requirements;
- they redistribute surpluses generated by the business back to their members according to how much the members have used the services provided by the business;
- they are democratically controlled by the members and are governed based on the principle of one-member, one-vote;
- they are incorporated which means that the liability of the members is generally limited to the amount invested in the co-operative.

What is a Farm Machinery Co-operative?

Farm machinery co-operatives are organized by groups of farmers who wish to share machinery and equipment. The members of a farm machinery co-operative pool their money to buy machinery and share fixed costs and operating expenses. The co-operative owns the machinery on behalf of its members. Members retain their land, buildings and permit books. Each member has one vote in the control of the business, regardless of how much capital they have invested in the co-operative.

Some farm machinery co-operatives also pool farm receipts in order to ensure machinery use is equitable. However, the pooling of farm receipts is optional, the choice being made by the members involved in the co-operative.

Farm machinery co-operatives differ from co-operative farms in that a co-operative farm acquires total control of the land base of its members. This may either be through purchasing or leasing the members' land holdings and/or leasing outside land. Land ownership is retained by individual members in a farm machinery co-operative.

Why Form a Farm Machinery Co-op?

The sharing of farm machinery through the formation of a farm machinery co-operative can provide farmers with a number of benefits, including:

- lower machinery costs - reduced machinery investment per acre frees funds to be used for other productive purposes;
- greater efficiency - by purchasing machinery as a group, members can achieve economies of scale by purchasing larger more efficient machinery;
- access to new technology - agricultural practices may be improved through access to a wider variety of specialized equipment; beginning farmers with limited capital have access to modern equipment they could not otherwise afford;
- access to greater pool of knowledge and resources - pooling of machinery in an organized manner can facilitate the pooling of other resources, such as labour, experience and ideas;
- price discounts on inputs - because co-operatives represent a greater volume of business, farmers can improve their buying power and negotiate better prices from input suppliers.

Small farms in particular can benefit from the formation of a farm machinery co-operative, as small farms may have excess machinery capacity and cannot benefit from economies of scale. Large farms may already be using their machinery capacity effectively because of the larger number of acres farmed. In addition, farmers with a small acre base can seldom justify specialized machinery such as large rock pickers or sprayers that can be more easily justified on a larger acre base.

Saskatchewan Farm Machinery Co-ops

Overview

Co-operative businesses, such as the Saskatchewan Wheat Pool and Federated Co-operatives, are dominant players in Saskatchewan agriculture. However, while co-operatives have been relied upon to market agricultural products and to supply farm inputs, few have been incorporated with a mandate to share farm machinery.

To date there are 38 co-operatives which are registered as farm/machinery co-operatives in Saskatchewan. It is estimated that less than half of these co-operatives are set-up with a mandate to share farm machinery and equipment among independent farmers. The majority of the co-operatives registered as farm/machinery co-operatives are co-operative farms, which pool land as well as machinery among a group of farmers.

Farm machinery co-operatives in Saskatchewan operate almost exclusively in the grain sector and tend to have five or fewer members. A minimum of two people are required to incorporate a farm machinery co-operative under the Saskatchewan *Co-operatives Act*.

Many machinery co-operatives operating in Saskatchewan were formed in the 1970s with help from the Saskatchewan Department of Co-operation. However, farm machinery co-operatives formed as recently as 1996 also exist.

The primary motivation behind the formation of farm machinery co-operatives in Saskatchewan is the lowering of machinery costs by being able to jointly purchase larger, more efficient machines or by being able to purchase machines that individual members could not afford alone, such as a high clearance sprayer or combine. One co-operative estimates that its members have reduced their equipment purchasing and maintenance costs from $20-$40 per acre to $14 per acre, while the members of another co-op feel they have realized a 50 percent savings in their machinery costs.

The results of a study comparing the costs of owning farm equipment co-operatively versus individually support the above estimates (Harris and Fulton). The study suggests that, on average, a grain farmer in Saskatchewan with 1,500 cultivated acres can expect to save 35 percent in total machinery costs per acre by sharing a piece of machinery with at least two other farms of equal size, as opposed to owning the machine individually. The savings in total machinery costs are due to the combination of lower fixed costs per hour (an average saving of 22 percent) and reduced hours required to operate the machine (an average saving of 32 percent). Operating costs per hour are on average 39 percent higher per machine for a co-op member. This is due to the selection of larger machines suitable for a combined acreage of 4,500 acres.

However, lower costs and increased efficiency are not the only motives behind the formation of Saskatchewan co-ops. Secondary reasons include the ability to share labour and to enable a younger generation of people to get involved in farming without a large debt burden.

Structure

Farm machinery co-operatives operating in Saskatchewan can be grouped into two different categories:

- those in which machinery and income is pooled among all members of the co-op;
- those in which machinery is pooled among all members of the co-op, but income is not pooled.

In both cases farmers join together to pool whole sets of farm machinery. In short, the co-op members share the bulk of the equipment and machinery required to perform core farm operations.

Member Formula

The structure and operations of Saskatchewan farm machinery co-operatives are based on a member formula or agreement developed by the group. The formula determines each member's equity contribution to the co-op and their share of the operating expenses and machinery costs. Co-ops which pool production also use the member formula to allocate net income.

The member formula is typically based on the cultivated acres contributed by a member as a percentage of the total cultivated acres involved in the co-op. For example, if a member owns or leases 800 cultivated acres of the co-op's total of 4,000 acres, the member's share is 20 percent. The member therefore provides 20 percent of the

money required to finance the equipment through the purchase of shares in the co-operative and covers 20 percent of operating costs. If income is pooled among co-op members, he will also receive 20 percent of all sale proceeds.

If there is a substantial difference in the productivity of members' land, the basis for distribution of costs and income can be adjusted accordingly. For example, the co-op may decide to incorporate factors such as the assessed value of land or the availability of irrigation into the member formula, in order to allocate costs and revenues more equitably.

The member formula may also take into account other contributions to the co-op besides land. For example, the formula may include inputs such as labour and machinery.

Governance

To incorporate in Saskatchewan a co-operative must submit bylaws outlining the governance structure of the organization. The formal governance structure of a co-operative is based on a board of directors who are elected by the members at an annual general meeting. Members each have one vote in electing directors and in voting on major policy decisions affecting the co-operative. However, since many machinery co-operatives in Saskatchewan are small (typically five members or less), all of the members are generally involved in governing the co-operative.

Decisions are typically made by consensus and informal meetings are held on a regular basis for the purposes of communication and to make joint decisions. In some cases, a coordinator is appointed to oversee the day-to-day operations of the co-op.

Production Decisions

In machinery co-operatives where both farm machinery and the income from production is pooled among the members, it is the co-operative (i.e., the group) which makes the decisions regarding what, when and how to produce. In essence, individual members assign their land for production purposes to the co-operative. The co-op manages all field operations and co-ordinates labour inputs by its members. However, each member retains his or her farmer status and therefore is entitled to a permit book. While income is determined at the co-op level, it is taxed in the hands of the members.

In machinery co-operatives where the income generated from members' farm production is not pooled, production decisions are made independently by the members or together as a group. Regardless of how production decisions are made, each member delivers the grain produced on his or her land and from this income pays his or her share of the co-op's operating expenses and machinery costs.

Termination of Membership

The co-op's bylaws outline what happens if a member retires, dies, quits the co-op or is asked to resign. The bylaws also include the terms of equity payouts. For example, if a member wanted to retire or sell the farm, he or she might be required to give notice 90 days notice before withdrawal. The member's equity would then be determined and would be paid out over a three year period to prevent financial drain on the organization.

Determining Machinery Requirements

Members determine their machinery requirements based on the combined cultivated land base of all co-operative members. As a result, farmers can benefit from economies of scale and can purchase larger, more efficient equipment than would make sense for an individual farm.

Upon incorporation, an inventory of all the equipment and machines owned by the members is taken. The group then decides what, if any, equipment to keep and what to sell or trade in. The co-op may decide to purchase, at fair market value, certain units of machinery owned individually by the members. The sale of equipment to the co-op by a member is commonly recorded as a credit to that member's equity contribution.

Scheduling

The fear that two or more members might have to use a particular machine at the same time is one of the biggest reasons why many Saskatchewan farmers are reluctant to share farm machinery,

especially with seasonal equipment such as seeders and combines. However, none of the members of Saskatchewan machinery co-ops interviewed as part of this project mentioned any significant conflicts around the timing and scheduling of machinery.

In co-operatives where income was pooled as well as machinery, members felt that the pooling of income is an important factor in helping to eliminate concerns over scheduling. In co-ops where income was not pooled, members shared an "it all works out in the end" attitude—they felt that to achieve the economic benefits from machinery sharing some compromise is necessary. In some cases, critical operations such as seeding and harvesting were completed together to avoid scheduling conflicts.

Sharing Labour

Labour is pooled in both types of Saskatchewan farm machinery co-operatives. The sharing of labour enables the members to take advantage of or develop expertise in particular areas. For example, one member may be in charge of machine repairs and maintenance, while another maintains the financial records for the co-op. The sharing of labour can also allow some members to either work more or less depending on their needs. For example, one member may wish to exploit off-farm employment opportunities while another may be interested in farming full time, but does not have enough land to do so.

Labour contributions are handled in different ways among the co-ops. In some co-ops, members who contribute labour are paid an hourly wage by the co-op. In others, each member is responsible for a particular area and all members are expected to contribute roughly the same amount of time to the co-op, therefore members do not get paid by the co-op unless they have contributed a much larger share than anyone else.

The following sections profile two farm machinery co-operatives currently operating in Saskatchewan. The Lakeside Farm Machinery Co-operative was formed in 1971 and is an example of a co-op in which production is pooled among members. In contrast, The Kipling Agricultural Machinery Co-operative Ltd. was formed in 1996 and is an example of a co-operative in which production is not pooled.

Lakeside Farm Machinery Co-op

In 1971, a group of seven farmers in the Dafoe area of Saskatchewan formed the Lakeside Machinery Co-operative. The co-operative was formed in response to a number of challenges shared by the group including tough economic times, low grain prices, the need to replace machinery, and most importantly, finding a way to help their sons get into farming.

In forming the co-op, the group agreed to purchase machinery together and pool their production. Each member retained ownership of their own land, but the grain or seed produced on that land was declared part of the co-op's overall pool. A formula based on the percentage of cultivated acres, owned, leased or rented by individual members was used to determine each members' share of every bushel of grain or seed grown. The same formula was used to determine each member's equity shares in the co-op. The member formula is adjusted each year to take into account changes in the member's land base.

Today the co-op farms 6,000 acres and is made up of five sons of the original members. The sons' involvement in the co-op was facilitated by allowing new members to gradually build equity in the operation—a member can join the co-operative with a land base and can build equity by having income deducted until the land base and equity contributions are in equal proportions. The level of investment in machinery, equipment and buildings by each member is much lower than if each member farmed separately.

As their fathers did before them, the members continue to pool their grain and seed. The land is farmed based on the best agroeconomic conditions, avoiding conflicts over whose field is seeded or harvested first or last. All decisions of the group are made by majority vote at regular meetings.

Although the basic structure of the co-op has changed little since its incorporation, the equipment needs and operations of the group have changed considerably. The pooling of resources within the co-op has encouraged the members to test new options. As the risk to individual members has been reduced, it has been easier for them to try new crops, farm techniques and equipment. Lakeside was one of the first in the area to grow lentils, buy an air seeder, use deep-banding and try seeding by airplane.

To begin the co-op, the original member's equipment was traded in on a line of equipment from Co-Op Implements in Wynyard. This new line included two tractors, two pull-type combines, diskers, Seedrite and two grain trucks. Today, the co-op's lineup includes a pair of four-wheel drive tractors, two swathers, two combines, a 62-foot Flexi-Coil air seeder and a 40-foot air drill, a semi, two grain trucks and assorted augers.

In 1984 the co-op decided to diversify and move into the seed business with a new subsidiary called Lakeside Seeds. By 1987, Lakeside Seeds had its own seed cleaning plant. In 1996, they formed a joint venture with the Saskatchewan Wheat Pool for a major seed plant located at Dafoe, just two miles from the Lakeside Machinery Co-operative's offices. The seed division currently handles lentils, canola, hard red wheat, CPS wheat, flax, peas and 2-row barley. They are also in the export business, specializing in lentils, mustards, peas and flax and canola for birdseed.

Members have worked hard at developing the group spirit necessary for the co-op's success. They have recognized that it can be difficult to accept the necessary blend of assertiveness and compromise needed to make a co-operative work. Strong family and community ties have made a difference and a respect for fellow members and good communications have been essential.

Kipling Agricultural Machinery Co-operative Ltd.

The Kipling Agricultural Machinery Co-operative Ltd. (KAMCO) was formed in April of 1996 by four farm families involved in the production of dryland cereal, oilseed and specialty crops. The impetus behind the formation of the co-op included the difficulty in hiring competent seasonal labour and the desire to reduce the costs of machinery by increasing scale.

The members decided to limit their commitment to the co-operative to the ownership and use of farm machinery and to the contribution of labour to the co-op. Land, crops and other assets are not pooled and the farm economies are kept separate.

While members plan their own cropping program and keep their grain separate, critical production decisions are made together. Once the member's planting decisions are made the group meets to decide on a strategy to complete key farm operations, such as seeding and harvesting. The strategy is based on agronomically sound principles. For example, if one parcel of land is dry then that is where the co-op begins planting.

Machinery operating and maintenance expenses are shared by members on a per-acre basis. The costs of maintaining and purchasing the machinery owned by the co-op are covered each year by dividing total expenses by total acres. The costs are then allocated to each individual farm based on spring seeded acreage. Throughout the year the co-op makes cash calls when money is needed to meet the co-op's expenses and loan payments. Each member has provided a promissory note to the Co-op to assure that obligations to lending institutions and suppliers can be met.

Labour is contributed by all members on a per acre basis. Shortages in labour contributions by members are assessed at $10 per hour and any excess in labour contributions are paid out at $10 per hour. The sharing of labour has helped solve some of the members' problems in getting reliable, experienced farm help.

In addition, members contribute different areas of expertise to the co-op. One of the members handles the bookkeeping and accounting for the co-op. Two members contribute their knowledge and experience with previous co-operative endeavors, including a hog-breeding co-operative. The forth is in charge of the maintenance and repair of equipment. A fee is charged to the co-operative for this service which includes labour, tools and a shop facility.

One of the initial steps in organizing the co-op was to determine the equipment needs of the group. An inventory of the members' equipment was taken. Five tractors were sold and two were retained. Three combines were traded or sold, one was kept and another was purchased. Two seeders were traded and two were retained. One swather, two cultivators and four grain trucks were kept. Each member's contribution of equipment was accounted for through a member loan granted to the co-op which equaled the agreed value of the machinery less any debt owing.

The sale of the equipment or its transfer to the co-op resulted in both credit and tax implications for the members. As is the case on most farms, some of the equipment was held as collateral for its purchase or to secure a line of operating credit. As members sold the equipment or transferred it to the co-op, their collateral disappeared. As a result some members had to mortgage land to secure the necessary credit. In addition, the sale or the deemed sale of the partially or wholly depreciated equipment resulted in recapture of

Capital Cost Allowance, with had negative tax implications for some members.

After three years of operation the co-op has accumulated approximately $675,000 in assets which include two combines, two zero till air seeders, a swather, four trucks, two cultivators, one harrow bar, and three grain augers. The recent purchase of a used high clearance sprayer has been particularly beneficial for the members. With a purchase price of $80,000 none of the members could have afforded the machine on their own. However, shared ownership has given members an advantage in being able to spray earlier and in wet conditions, in addition to saving money by eliminating the purchase of custom spraying services.

The pooling and optimum use of the equipment through the co-op has reduced equipment-related costs for the small farms involved from up to $40 per acre to $14 per acre, and for the larger farms from $20 per acre to $14 per acre. Time savings is another important benefit. For example, since joining the co-op one member's land was seeded in four and a half days and harvested in three days. When farming independently, the same member required 21 days to seed and 15 days to harvest.

The CUMA Co-operatives

Background

The CUMA, Coopératives d'Utilization de Matériel Agricole, loosely translated as "co-operative for the use of farm implements," is a type of farm machinery co-operative being used extensively by farmers in Quebec. Since the incorporation of the first CUMA in Quebec in 1991, more than 1,000 farm operations have become members of the more than 47 CUMAs established in the region.[1] An additional three CUMAs are projected to incorporate within the next six months. The successful implementation of CUMA's in Quebec has also encouraged farmers in Ontario to do the same, with 1997 marking the formation of the first CUMA in Ontario.

Direct economic advantages to producers from being part of a CUMA include cost savings and access to newer, more efficient equipment. These economic gains create an incentive for producers to compromise and ensure that the CUMA runs smoothly.

For the most part the CUMAs are formed by dairy farmers interested in sharing forage equipment, such as harvesters, seeders, and hay balers. According to GREPA (an economic and agricultural research group), equipment costs on Quebec dairy farms comprise about 20-25 percent of their total expenses. Joining a CUMA can help decrease these expenses, as well as overall production costs. Some estimate that the equipment and machinery costs are lower by as much as 70 percent.[2] Using shared machinery also allows for the purchase of the most up-to-date equipment, which is larger and more efficient than what individual producer could purchase alone. On farm efficiency is therefore improved considerably.[3]

While the majority of the CUMAs have been formed by dairy producers interested in lowering machinery costs, the idea has inspired interest in co-operatively addressing other problems, such as the shortage of skilled farm labour. Producers involved in the hog, poultry, beef and vegetable sector are also beginning to form

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[1] Government of Quebec, .
[2] Lebel, 1995.
[3] Government of Quebec.

CUMAs. The idea has sparked interest in other industries as well, including fisheries and forestry.

Structure

Like other farm machinery co-operatives, the mandate of the CUMAs is to share equipment among its members. A CUMA owns the equipment and then rents it out to its members at the lowest possible cost. However, unlike Saskatchewan farm machinery co-operatives in which entire machinery sets are pooled among all members, CUMAs are structured to allow the sharing of individual machines among sub-sets of members. The sharing of individual machines is facilitated through the use of activity branches and member contracts.

Activity Branches and Member Contracts

To obtain the right to use the equipment and machinery owned by the CUMA, participating members must join an activity branch. Each activity branch corresponds to the use of one machine, piece of equipment or service. A minimum of 3 members per branch is recommended.

Figure 1 shows the organizational structure of a hypothetical CUMA farm machinery co-op. In this example the CUMA is organized into three activity branches. Each activity branch corresponds to a different machine or farm operation, in this case a hay baler, seed drill and forage harvester.

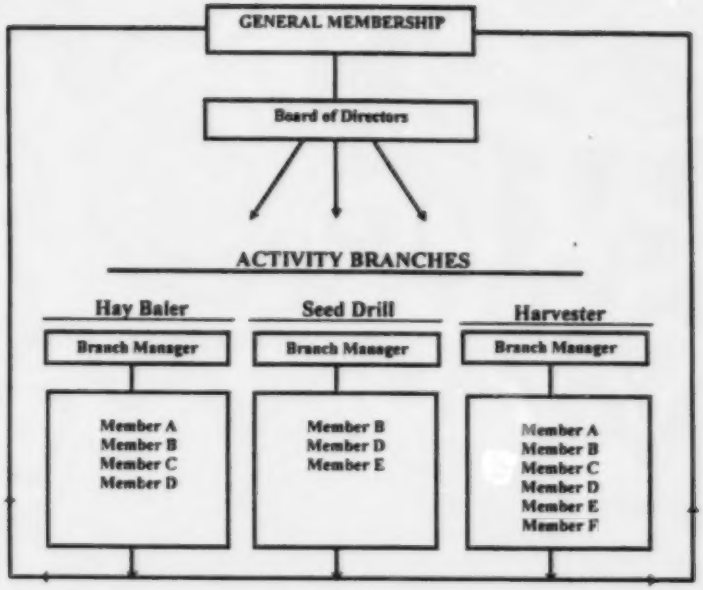

Figure 1. Organizational Structure of a CUMA

Upon joining an activity branch, each member must sign a subscription contract which commits them to using the particular piece of equipment or machine for a specific amount of time or number of units per year for the duration of the contract. The duration of the contract is typically the same length of time over which the machine is being financed (usually three to five years).

For example, consider a producer (member A) who joins the CUMA illustrated in Figure 1 in order to share the costs associated with a hay baler. The producer forms an activity branch with three other producers in the area who are also interested in sharing a hay baler. Each member signs a subscription contract that specifies how much he or she intends to use the hay baler over the next five years (the number of years for which the baler will be financed). The CUMA then purchases a hay baler that meets the combined needs of all of the branch members.

Financing

CUMAs are financed through three sources of capital:

- members' investment shares,
- traditional sources of debt financing, and
- members' fees.

To join an activity branch each member must purchase a certain number of investment shares which provides the CUMA with the equity capital needed to purchase the machine. Member investment shares do not receive interest and are typically used to finance 20 to 30 percent of the purchase cost of the equipment.

In most cases, member investment shares are divided equally among all branch users. For example, in the CUMA illustrated in Figure 1 the four members who commit to using the hay baler must each purchase shares equal to 5 percent of the cost of purchasing the baler (20 percent divided among the four members). Since the machinery cost associated with the harvester is spread among six members, each member must purchase investment shares which equal 3.3 percent of the harvester's purchase price. In a few cases, investment shares are divided among members according to their use of the machine, as specified in the subscription contract.

The remaining 70 to 80 percent of an activity branch's capital costs are covered through loans with financial institutions, such as credit unions or banks. In general CUMAs finance their machines over a three to five year period, and in rare cases over a seven year period. The period over which a machine is financed corresponds to the length of the subscription contract signed by each branch member. Financing periods are purposefully kept short to ensure a relatively quick turn over in the equipment and machinery used by a CUMA's activity branches. Quick turnover rates allow members to take advantage of technological advances. High turnover also implies lower maintenance and repair costs and a higher resale value when the activity branch is terminated (i.e., members' subscription contracts expire).

In addition to paying their share of the 20 to 30 percent of the purchase cost of the equipment, members must also pay member fees on a regular basis—typically four times a year or season. Member fees are used to cover the annual rent of the equipment which includes:

- the real cost of financing (capital and interest) the equipment;
- the inherent costs of using the equipment, including insurance, repair and maintenance costs, and storage costs.

A member's share of the annual rent is determined in proportion to the member's use of the equipment in the given year and the amount of use they have committed to in their subscription contract.

The annual rent is typically fixed for the year, based on projected costs. At the end of the year the annual rent is subject to adjustment in order to take into account the real costs of use. Although the CUMA tries to run its operations on a service at cost basis, a surplus can arise. Surpluses may be retained by the CUMA in reserve or returned to the members in proportion to their machinery and equipment use. If surpluses are returned, members can expect to be charged a lower member fee on their final bill for the year.

In the case that a member is unable to use the equipment as much as he or she has committed to in the subscription contract, the member is still bound to respect the financial agreement set forth in the contract. That member will therefore still be billed for the same amount that was originally specified in the contract.

Governance

There are four types of players involved in the administration and governance of a CUMA:

- the general assembly (or membership);
- the board of directors;
- the branch manager; and
- the equipment manager.

In the example illustrated in Figure 1, six members are recruited and make up the general assembly. The board of directors is composed of members elected by the general assembly. The board oversees all the co-op's business, including all activity branches.

Each member is entitled to one vote in electing directors and in making other decisions regarding the co-operative, regardless of the number of activity branches to which they belong or the amount of money they have invested in the co-op. Voting by proxy is not allowed.

The board, based on the recommendation of the branch members, designates someone to be in charge of each activity branch. The branch manager organizes the use of the equipment or machine, including administering schedules. He or she also ensures that

contractual agreements are kept, that is, members adhere to their subscription contract. In some cases a member is also chosen to be responsible for equipment care, although the tasks of branch manager and equipment manager are often combined. The equipment manager is in charge of the upkeep, delivery and repair of the equipment.

Both branch and equipment managers report to the board. Before each annual general meeting, branch managers of each activity branch to hold a meeting of their members for the purpose of evaluating the season just ended. Any concerns are then taken to the board at the annual general meeting.

Administration and Scheduling

The order by which the members of an activity branch use the machines and equipment is determined through a draw held in the first year of operation, or by some other means deemed acceptable by the majority of the branch members. For example, machinery use can be allocated according to soil types or types of seed being planted.

The last user of the equipment is not bound to return it to the branch manager. However, he must advise the branch manager that he has finished using it, so that the next person in line can take her turn.

A log book accompanies each piece of equipment and machinery owned by the CUMA. Each member is obligated to enter into the log book:

- how much he or she used the equipment (for example, the number of bales, hours or acres used);
- the date and time of any breakdowns or noted anomalies
- the date, time and nature of any repairs or maintenance performed.

In the case of a breakdown the branch and equipment manager, together with the branch members if necessary, determine the nature and cause of the breakdown by using certain criteria, such as work overload, faulty maintenance, fault in driving, etc. With a breakdown that is not of an accidental nature the member at fault must assume the costs to repair. In cases that require litigation, the board of directors decide on the action to be taken.

If a major no-fault breakdown occurs during the year and the co-operative does not have enough funds in reserve (collected from the members of that activity branch) to carry out the repair, an additional rent is billed to the members of the branch.

Modification or Termination of an Activity Branch

If the majority of participating branch members want to change their particular piece of machinery or equipment at some point throughout an existing contract it can be sold. However, since the equipment belongs to the whole co-operative, only the board can decide whether or not to sell it. Money from the sale of the equipment can be used to decrease the member fees or be put towards the purchase of the next piece of machinery. The existing subscription contracts have to be cancelled and new ones drawn up and signed by the participating branch members.

As the subscription contracts of a particular activity branch expire (i.e., when financing of the machine is complete), the participating members can choose to end the activity branch, if they wish. Again, board approval is required before the associated machine or piece of equipment can be sold. Any profits made on the sale of the machinery are added to the co-operative's reserves. The original members of the activity branch may be entitled to a reimbursement for their share, depending on the financial particularities regarding the machine or equipment.

Sharing of Labour

In a CUMA, each member is responsible for operating the equipment and machinery independently. However, some CUMAs have developed activity branches in order to share general farm labour. For example, many of the CUMAs have a farm labourer as one of their branches. The members of the CUMA who are interested in having a hired hand help out on their farm, but who do not have enough work to justify hiring a labourer full time, can join this branch. The branch operates along the same principles as the equipment branches. To join, members must commit to hiring the labourer for a specific number of weeks per year.

For the members, sharing labour this way allows for greater access to a stable supply of skilled labour. For the worker, the

CUMA provides stability as the labour requirements are spread among a number of producers.

The following sections describe the development of three CUMA's: the Saint-Fabien CUMA, the first CUMA formed in Quebec; the Leclercville CUMA, a CUMA in which labour as well as machinery is shared; and the CUMA Franco-Agri, the first CUMA to be formed outside of Quebec.

Saint-Fabien CUMA

The first CUMA in Quebec was formed in 1991 by a group of ten producers from Saint-Fabien, working together with a representative from the Quebec Ministry of Agriculture, Fisheries and Food (MAPAQ), Camille Morneau.

The Saint-Fabien CUMA was modeled after the CUMAs already in existence in France. Morneau first read about the CUMAs in France as part of his masters thesis at the University of Quebec. The French CUMAs have their roots in de Gaulle's first post-war cabinet which supported the creation of co-operatives to encourage the collective purchase and use of scarce farm equipment in the immediate years after the second world war.[4] Although the rationing of tractors and other farm equipment has long ended, there are still close to 13,000 CUMAs in France, representing approximately 400,000 members.[5]

After studying the model and visiting CUMAs in France, Morneau decided to try to apply the model to Quebec. The producers of Saint-Fabien were an ideal trial group, having had experience with other types of machinery sharing arrangements in the past and having heard about CUMAs from French agriculture students working on Quebec farms during the summer months. With an average age of 35, many of the producers involved in the project were keenly interested in experimenting with new ways of lowering the machinery costs and the debt burden facing many young farmers.

Morneau describes the development of the first CUMA as a very delicate process. He knew that the success of the first CUMA would be watched closely, with many outside producers and government bureaucrats believing that such an arrangement would never work. However, once the first few CUMAs were up and running other producers quickly became interested in the idea and the Quebec government began to support their development. As a result Morneau's position with the ministry of agriculture has evolved to enable him to provide hands-on assistance on a full time basis to producer groups involved in forming a CUMA.

While Morneau concedes that there are other types of equipment sharing programs available, he feels that the co-operative structure is more advantageous. "The social aspect of a co-operative is an integral part of its overall success, and in this way differs from other types of machinery sharing agreements. Co-ops are much more than just an efficient way of purchasing machinery...they allow people to meet one another, to work together, to share one's experiences and skills. It helps revalidate the agricultural producer."

While the ultimate goal behind the formation of the Saint-Fabian CUMA was the reduction of production costs and increased efficiency of farm operations, the members of the co-op have also benefited from a strong sense of community and a revitalization of basic rural values, such as co-operation and helping one another. This sense of community was evident at the recent General Assembly of the Saint-Fabien CUMA, where close to 90 percent of the members were present.

The pioneering Saint-Fabien CUMA now boasts 33 members who share the use of about 20 machines, organized into 16 different activity branches. The members encompass about 80 percent of the farmers within the municipality.

Leclercville CUMA

The Leclercville CUMA was officially founded in July of 1994. At its inception the CUMA had five members and no assets. One year later, the number of members had climbed to 12 and the CUMA owned $35,000 worth of machinery organized into two branches. By 1998, the Leclercville CUMA had 22 members, 16 machinery branches, with $150,000 worth of equipment.

In addition to sharing farm machinery and equipment, the Leclercville CUMA also has a personnel branch which hires out replacement employees to members wishing to be temporarily absent from their operation. The CUMA hires a labourer every year to meet

[4] Raup, 1975.
[5] Lebel, 1995.

the needs of the seven branch members. The members meet every three months to discuss their labour needs and to develop a schedule. The schedule is submitted to the Board of Directors and the hired labourer then goes from farm to farm.

For the members, sharing labour through the CUMA allows for greater access to a stable supply of skilled labour. It has also enabled many producers to comfortably leave their farm for certain periods (to take holidays for example)—something which few were able to do before joining the CUMA. The CUMA also undertakes all the hiring and administrative duties. For the farm worker, the CUMA provides stability as the labour requirements are spread among a number of producers and employment is guaranteed through a legally binding contract.

Despite the rapid expansion of the Leclercville CUMA the co-op has faced no serious growing pains. The most difficult challenge facing the co-op to date was an instance where an activity branch made an inappropriate purchasing decision and wanted to change a machine. Because the machine was still being financed the switch created a loss. The problem was easily resolved by dividing the loss among the members according to their use over the past 3 years.

In anticipation of scheduling problems, the founders developed a list which outlines the order in which members use the equipment. The initial list was determined by drawing straws and the list now rotates with the first one using the equipment this time becoming the last to use the equipment next time. However, the CUMA has had to refer to the list only once in four years of operation since scheduling has remained flexible, with members being able to access the machines whenever they have needed them. In the one case where a member was not able to access the machine when needed, another member was able to lend him an older machine to complete the operation.

Members feel that conflicts have been minimized through constant communication among the members. Any conflicts that come up are dealt with by sitting down right away to resolve them. More extensive meetings are also held at the end of the season to evaluate the operations of the activity branches and to identify any changes that need to be made for the following year.

CUMA Franco-Agri - St. Anne de Prescott, Ontario

The first CUMA in Ontario, CUMA Franco-Agri, began operations in 1997. The CUMA evolved from previous machine sharing arrangement referred to as a "Machinery Bank" which was established by a group of 10 dairy producers. The producers met and listed the machines and equipment that they each owned. The list was then circulated among the group allowing them to rent the machines from one another. The producers still owned their own machines and they had priority of use, but others could rent the equipment when available. Because of the incentive to generate extra revenue and lower the costs associated with owning the machines, it ended up that the producers would reorganize their production somewhat to facilitate the renting of their machines.

The experience with the machinery bank gave the producers involved some practice and familiarity with the idea that if producers make their production decisions interdependently, machines could be shared to everyone's greater benefit. The arrangement eventually evolved into a CUMA which is organized into three activity branches and owns a corn harvester, rake and hay baler.

Before the machinery co-op could become a reality however, a number of meetings were required to plan the co-op's operations and complete the paperwork necessary for incorporation. To make the decision to purchase a machine the members worked with a farm management consultant and calculated the cost of the machine and the number of acres required to make the machine run efficiently and pay off the loan.. The comparison, or acid test, was always made with respect to the cost of having the operations custom done.

Although the CUMA took quite a bit of time to organize initially, now that it is established the time commitment required by members is minimal. One member is in charge of administering the branch—he is the person members call if there is a problem or if they need information regarding scheduling. Another member is in charge of repairs which he either does himself and then bills the CUMA or he hires someone else to do them and submits the invoice.

Forming a Farm Machinery Co-operative - Considerations

CUMAs in Saskatchewan?

The success of the CUMAs in lowering the machinery costs for the producers involved raises the questions: Can CUMAs work in Saskatchewan? And under what conditions would a CUMA structure be appropriate? In this section we consider these questions by examining the concerns producers commonly have about sharing farm machinery and looking at how the different types of co-operatives in Saskatchewan and Quebec address these concerns.

Issues of primary concern to producers regarding the sharing of farm machinery and equipment include:

- conflicting time requirements;
- loss of independence;
- different machinery and equipment needs;
- joint liability;
- carelessness.

Conflicting Time Requirements

Of primary concern to many farmers interested in sharing farm machinery is the potential for conflict over the scheduling and use of machinery and equipment. The potential for conflicting time requirements will largely depend on:

- how time-sensitive members' operations are—that is, how much time is available to complete certain operations without having a significant impact on farm returns;
- the increased efficiency with which operations can be performed—the ability to purchase larger and more efficient machines may provide members with a larger window of opportunity and may mitigate timeliness issues;
- the different attributes of the land involved—the more different the individual land holdings are, the less likely there will be scheduling conflicts among members. For example, one member's land may still be wet, while another's may be dry and ready to seed;
- the goals and attitudes of the members involved—a key to the success of any co-operative venture rests on the ability of the members to compromise and work together. Scheduling conflicts are minimized when members take a long-term approach and feel that the arrangement is fair.

The CUMAs in Quebec have not faced serious scheduling conflicts among their members. This is primarily due to two factors. First, the type of production (e.g., hay) is not as time sensitive as other types of production (e.g., grain for human consumption). Therefore the window of opportunity to complete certain operations for a CUMA member in Quebec is generally much larger than the window of opportunity available to a Saskatchewan grain farmer.

Secondly, the type of machinery that CUMA members can purchase together is typically much larger than the type of machinery that could be purchased as an individual farmer. Therefore, the economies of scale realized from machinery sharing allow for operations to be completed faster. For example, where it may have taken a full day for a farmer to seed his fields before, with the CUMA's seeding equipment it may now only take him a couple of hours.

Like all successful co-operative ventures, an additional key to minimizing conflict lies in the attitude of the people involved. For the most part CUMA members recognize that in order to achieve the economic benefits from machinery sharing some compromise is necessary. In general, CUMA members take a long-term approach, recognizing that while they may not be able to complete an operation at the most optimal time this year, they will likely be able to do so the following year, and that the benefits from sharing machines outweigh this potential loss.

In grain farms in Saskatchewan timeliness has a much larger economic impact on farmers—not being able to seed or harvest at the optimal time can significantly lower net returns. Many co-operatives choose to pool income to avoid scheduling conflicts and to ensure that operating costs and revenues are divided in a fair and equitable manner. In co-ops where income is not pooled, members sometimes choose to complete critical operations together, such as harvesting and seeding, in order to avoid scheduling conflicts. Operations which are not time sensitive are completed independently.

These characteristics suggests that while the CUMA model may work well for some types of farm machinery used in Saskatchewan, it may not work well for machinery used in extremely time sensitive operations, such as grain seeding and harvesting. Examples of machinery which could lend themselves well to a CUMA style sharing arrangement include rock pickers, forage equipment, and large sprayers.

Loss of Independence

Sharing equipment will inevitably result in some loss of independence for individual operators. However, different machinery arrangements involve different levels of dependence. In a CUMA individual members have the choice as to what machines they wish to share, allowing members to make their production decisions virtually independently. As individual operators, each member decides what, where, when and how to produce. The only decision that is dependent on other members of the CUMA is when that member is scheduled to use the equipment to complete a particular operation. In most cases CUMA machinery is available when needed, but members must inform the activity branch administrator when he or she intends to use the equipment and when he or she is finished with it.

In comparison, the level of dependence among members of Saskatchewan co-operatives is much higher. While the pooling of income can help to eliminate scheduling conflicts, the trade-off with this structure is a loss of independence. Under this type of arrangement members must make their production decisions together—that is, they must unanimously decide what, where and how to produce.

Even if a co-operative chooses not to pool income and pools only machinery, the degree of independence involved in production decisions is limited when entire machinery sets are shared as opposed to sharing individual machines. Sharing whole machinery sets will work well only if everyone is generally using the same production methods, e.g., if all members are using a direct seeding system. This suggests that if production practices are largely dissimilar and members do not want to change, or members wish to have the freedom to change production practices, then a CUMA style farm machinery co-operative may be better suited.

Different Machinery and Equipment Needs

Another aspect of dependency in sharing farm machinery is the requirement to reconcile differing machinery and equipment needs and desires regarding type, model and size. Decisions on what type of equipment to purchase can be particularly complex when whole machinery sets are being shared. While such decisions can also be difficult within a CUMA, the complexity is somewhat limited by having equipment and machinery organized into activity branches. Activity branches give members the freedom to only invest in machines and equipment that they plan to use. As a result, the desire for different types of models and sizes of machinery must be reconciled only among the members of a particular branch and not among all the members of the co-operative.

Liability

The primary concern regarding liability is focused on what would happen if one member were unable to meet his or her share of the debt repayment on financed equipment—would other members end up paying more than they initially anticipated? The members of a CUMA are bound by a legal contract to pay their portion of the debt. Such contracts limit the ability of members to walk away from their financial obligations to the CUMA. Similarly, the bylaws required to incorporate Saskatchewan farm machinery co-operatives also limit members from shirking their financial responsibilities to the co-op. When compared with other types of machinery sharing arrangements which are not incorporated, co-ops provide producers with a certain degree of protection from liability.

In comparing the CUMA structure with the farm machinery co-operatives in Saskatchewan, it is worth noting that CUMA members have the flexibility to limit their initial investment in the co-operative. Because machinery sharing is organized through activity branches a reluctant CUMA member can limit his or her initial level of investment by limiting their participation to one or two activity branches. Once the member is familiar and comfortable with the concept of the CUMA, he or she can then decide to gradually increase their level of involvement. This feature of the CUMAs contrasts with farm machinery co-operatives in Saskatchewan where it is common practice for new members to

commit to sharing an entire line of machinery and equipment right from the start. As a result the initial level of investment in the co-op can be much greater.

Careless or Inexperienced Operators

The risk of sharing equipment with a member who is inexperienced or careless, and the associated increased maintenance and repair costs, can quickly turn people off of the idea of sharing farm machinery.

The concern regarding carelessness is alleviated somewhat within the CUMA through the establishment of internal rules and bylaws which lay out how the co-operative will handle such a scenario. The rules of a CUMA clearly state that careless or poor operators who cause excessive wear and breakdowns of machinery and equipment are responsible for paying for the damage they cause. Members concerned about carelessness can bring these concerns to the branch administrator who will investigate the claim and, along with the other members of the activity branch, will determine whether any damages are the result of negligence or simply regular wear and tear. If concerns cannot be addressed at the branch level, members can take the issue to the board and the general membership to work out a possible solution.

Having a structured way to deal with potential conflicts, one that involves a number of different people, can provide members with the assurance they need to feel comfortable when sharing equipment. In the CUMA, the rules regarding carelessness and the process for dealing with it are developed before the co-op is up and running. Members therefore know how situations of careless use will be handled before such situations arise.

Like the CUMAs, Saskatchewan machinery co-operatives often use member agreements to address and avoid conflict around carelessness. However, these issues are also minimized because many of the members of Saskatchewan farm machinery co-ops know each other well before forming the co-op. Often the members of farm machinery co-operatives in Saskatchewan are either related or have been neighbors for a long time. This relationship allows the members of the co-op to be familiar with each other's habits and allow them to "prescreen" members before they join the co-op, thereby reducing the risk of increased repair and maintenance costs.

The risk of having an inexperienced or poor operator are further reduced since the members of Saskatchewan co-ops often share labour and specialize in certain areas. For example, one person may specialize in operating a high clearance sprayer while another may be responsible for operating seed cleaning equipment.

Choosing A Structure

The above discussion suggests that the CUMA model could appeal to producers whose concerns about the sharing of farm machinery are not addressed under the farm machinery co-operative arrangements currently used in Saskatchewan. By the same token, the discussion also serves to point out certain situations where the traditional model of farm machinery co-operative used in Saskatchewan may indeed be a more suitable choice.

In general, the features of CUMA co-operatives appear to be well suited in situations where some or all of the following features are present:

- some or all of the producers involved wish to share only certain machines (not an entire machinery set);
- members cannot agree on equipment selection for the entire group;
- timeliness issues are minimal—large losses in income are not sustained if machinery is not used optimally (for example, if the members are part-time farmers or operations are not time sensitive);
- members would like to begin sharing machinery gradually, starting with less-critical or expensive machines, either because they do not know each other well or they wish to limit their initial capital investment in the co-operative;
- members do not share similar production methods.

Saskatchewan-style co-operatives in which production is not pooled and only machinery is shared, appear to be well suited to situations where one or more of the following features are present:

- the members involved wish to share entire machinery sets, as opposed to individual machines;
- members wish to make production decisions independently, but share similar production methods;

- there may be a loss in income if machinery is not used optimally, but members share an "it all works out in the end" approach and feel that the benefits from sharing machinery outweigh the losses;
- members wish to share labour and want to take advantage of particular areas of expertise within the group.

Saskatchewan-style co-operatives in which returns and production is pooled as well as machinery and equipment, appear to be well suited to situations where some or all of the following features are present:

- the members involved wish to share entire machinery sets, as opposed to individual machines;
- the potential for conflict regarding machinery use is high—members face a significant loss of income if machinery is not used optimally;
- members are willing to make production decisions together as a group, democratically or by consensus;
- members wish to share labour and want to take advantage of particular areas of expertise within the group.

Some of the questions you will need to ask yourself in determining how your co-op will be organized and in crafting the bylaws which will support your choices include:

- Will crops be pooled and production decisions made as a group or will production decisions be made individually and crops remain separate?
- Will the co-op be set up to share individual machines or whole machinery sets?
- How will the co-op allocate costs and/or revenues?
- What are the tax implications of your co-operative?
- How will the co-op handle labour contributions?
- What are the machinery needs of your group?
- How will you finance the co-op?
- Will the co-op purchase any machinery from the members?
- How often will you replace the co-op's machinery?
- How will you return the equity of members who leave the co-op?
- Is there any assistance available to your group?

Critical Success Factors

Regardless of how a co-operative is organized and structured, there are a number of factors which are critical to the successful formation of any farm machinery co-operative.

Compatibility

In any form of collective endeavor, the compatibility of the people involved is crucial to the success of the project. Locating and selecting individuals who get along and respect one another is most important. While compatibility does not necessarily mean similar personalities, it does require that members share a willingness to compromise and listen to other member's viewpoints.

The democratic nature and shared control of co-operative arrangements underscores the need for the people involved to be prepared to "give and take". In most farm machinery co-operatives decisions are made by consensus. In some larger farm machinery co-operatives decisions are made democratically and based on one-member, one vote. If members have difficulties in getting along or in making decisions together during the organizational stages of a co-op, chances are they will not be able to work successfully together once the co-op is operational.

Clear Economic Benefits

A clear understanding of the economic benefits to be had from co-operating is an excellent incentive for people to compromise. Before forming a co-op the economic viability of the venture needs to clearly assessed, taking into account the cost involved in transferring equipment from farm to farm and comparing the cost of possible alternatives such as leasing or custom work.

The primary economic benefit for most members of farm machinery co-operatives are reduced machinery costs. However, other goals may be equally important for some members. Such goals can include the ability to share labour, having access to the latest technology, or being able to give a son or daughter the opportunity to carry on with the family farm. The benefits from being a member of the co-op do not have to be the same for everyone. However,

people's motivations for joining the co-op and their expectations regarding the benefits from doing so should be clear to everyone involved, as this will help to minimize disappointments and the potential for conflict.

Communication & Planning

Good communication between members is essential to minimize conflict and to make sure that benefits are obtained. Members need to be prepared to talk about their thoughts, ideas, concerns and expectations about the co-op openly and regularly. Because all co-ops involve some degree of mutual dependence, members must also be prepared to plan and organize their work to accommodate the needs of others.

Many successful co-ops have regular business meetings once a week or even a short meeting each day. Regular meetings provide members with an opportunity to plan their operations and discuss problems while they can still be easily solved—problems which are not discussed and left unresolved can bottle up and eventually destroy the co-op.

Accurate Records

A key to the successful operation of any business is the maintenance of accurate records and a solid bookkeeping system. While this function is often administered by an accountant or bookkeeper hired by the co-op, each of the members involved must be willing to keep track of the day-to-day information (such as repairs completed, hours of machinery use or labour contributed) required for an accurate set of records.

Written Agreements

Written agreements help members to clearly understand the workings of the co-operative and their rights and responsibilities. Much of the information about how a co-op is organized and structured is outlined in the co-op's Bylaws. Members should be familiar with the bylaws and ensure that they reflect the group's objectives. Contractual agreements can also be used to commit members to meeting certain responsibilities with respect to the financing and use of machines for example. Contracts can provide some members with the assurance they need to feel comfortable when sharing equipment.

Appropriate Levels of Investment

Accurately determining the machinery and equipment needs of the members and investing accordingly is critical to the success of a farm machinery co-operative. Both the yield and capacity of each machine that is slated to be shared has to be considered. Two potential downfalls are:

- Over-investment—when machinery is purchased which is too big and too powerful for the co-op's actual needs or when the co-op creates a need rather than responding to a need already in place; and
- Under-investment—when machinery is purchased that does not have the capacity to accomplish the required work, especially during peak periods.

The result of over-investment is an increase in the production costs. The result of under-investment is an increase in material and labour costs. The common result of both situations is dissatisfaction with the co-operative.

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Farm Machinery Co-operatives: An Idea Worth Sharing

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October 1999

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Forward

This booklet documents the results of a simple financial model developed to compare the costs of owning selected types of farm machinery as individual farmers and as members of a farm machinery co-operative. This is one of a series of three booklets which document the results of a study examining the applicability of different types of farm machinery co-operatives to Saskatchewan agriculture. A second booklet *"The CUMA Farm Machinery Co-operatives,"* focuses on a type of farm machinery co-operative which has been used successfully by a large number of farmer in Quebec. The third booklet *"Farm Machinery Co-operatives in Saskatchewan and Quebec"*, describes different organizational structures used by farm machinery co-operatives in Saskatchewan and Quebec and provides some guidelines for forming a successful farm machinery co-operative.

Acknowledgement

This booklet and research project were funded by the Agricultural Development Fund of Saskatchewan.

The authors wish to thank the many people involved in farm machinery co-operatives in Saskatchewan, Quebec and Ontario who were interviewed as part of this project. Without their insight and openness in sharing information this research could not have been completed.

Introduction

Farm machinery is becoming more expensive to purchase and own. The high cost of farm machinery is making it difficult for smaller farm operations in Saskatchewan to remain economically viable, to replace major machinery, and to access new farming technologies which require large investments in machinery and equipment. For example, the movement towards direct seeding (see page ??) requires purchasing specially adapted equipment and substantial capital investment in new farm machinery.

The combination of increasing machinery costs and the need for continued technological innovation has motivated many farmers to examine new arrangements to share equipment to reduce machinery costs and release limited capital for other uses. One such arrangement which has been used successfully is machinery co-operatives.

Co-operatives are a type of business which is owned and controlled by the people who use the services provided by the business. Farm machinery co-operatives are organized by farmers who wish to reduce the purchasing and operating costs of farm machinery. Each member has one vote in the control of the business, regardless of how much capital they have invested in the co-operative.

The members of a farm machinery co-operative pool their money to buy machinery and share costs and operating expenses. The co-operative owns the machinery on behalf of its members. Members retain their land, buildings and permit books. Some farm machinery co-operatives also pool farm receipts in order to ensure machinery use is equitable. However, the pooling of farm receipts is optional and depends upon the needs of the farmer members involved in the co-operative.

The sharing of farm machinery through the formation of a farm machinery co-operative can provide farmers with a number of benefits, including:

- lower costs - the costs of owning and operating machinery co-operatively are estimated to be 35 percent lower than the costs associated with individual ownership;
- greater efficiency - by purchasing machinery as a group, members can achieve economies of scale by purchasing larger more efficient machines;
- access to new technology - group purchases can provide individuals faster access to technology they would otherwise not be able to afford;
- access to greater pool of knowledge and resources - the pooling of machinery in an organized manner can also facilitate the pooling of other resources, such as labour, experience and ideas.

This booklet documents the results of a financial model that quantifies some of the benefits that Saskatchewan grain farmers can expect to achieve through farm machinery co-operatives. Specifically, the model compares the costs of owning farm machinery as individual farmers with the costs of owning machinery as members of a farm machinery co-operative. Since the optimal size of machinery varies for an individual farm as opposed to a co-operative made up of several farms, the time required to complete operations under both scenarios is also examined.

The model considers cost and efficiency variables for selected machines and equipment typical to a Saskatchewan mixed grain farm. The variables examined include:

- Time Requirement (hours needed for farm operation)
- Fixed costs
- Operating costs
- Total Machine Costs
- Rental Costs
- Complement Costs

In the first part of this booklet, the cost comparisons are presented on a machine by machine basis. In the second part, the overall costs associated with whole machinery sets corresponding to both a direct seeding and a conventional seeding system are examined.

The Movement Towards Direct Seeding in Saskatchewan

The movement towards direct seeding is one of several factors affecting Saskatchewan agriculture's capital investment trends. The move to this new system of farming requires many equipment changes and large investments in machinery. Some of these changes and investments include the following:

- Special straw chopping and spreading equipment - the straw and chaff must be spread evenly across the field to reduce plugging and bunching during direct seeding.
- A reliable sprayer - a reliable sprayer is necessary due to the greater reliance on chemicals in a direct seeding system and the fact that a chemical burn-off of plant growth is usually done before seeding.
- A windscreen - a windscreen may be required on the sprayer to complete the spraying job at the optimum time.
- A specially adapted swather with pickup reels, or a combine with a straight cut flex header and pickup reels. Rotations require special attention with a direct seeding system. It may be beneficial to rotate from a cereal to an oilseed or pulse and back to a cereal. Most pulses such as lentils and peas require either a specially adapted swather with pickup reels, or a combine with a straight cut flex header and pickup reels.
- In many cases the switch to straight combining requires a switch from a pull type to a self-propelled combine.

Most farmers find that they are moving towards a completely different system of farming when they adopt direct seeding—it is not an isolated operation. The large costs associated with purchasing the required machinery and equipment makes it difficult for many farms to adopt this new technology, regardless of the possible gains in production.

Reference: Farmfacts - Machinery Arrangements, Saskatchewan Agriculture and Food, available on the Internet at http://www.agr.gov.sk.ca/saf.

Summary of Results

Cost Comparisons by Machine

Table 1 provides a listing of the types and size of equipment compared for both an individual farmer and a co-op member.

Table 1. Types of Machines and Equipment Compared

	Individual	Co-operative
Air Seeder, Conventional	28' - 30' Air Seeder	46'-47' Air Seeder
Air Seeder, Zero Till	28' - 30' Air Seeder	46'-47' Air Seeder
HD Cultivator	34'-35' HD Cultivator	58'-60' HD Cultivator
Harrow Packer	70' Harrow Packer	80' Harrow Packer
PTO Sprayer	60' PTO Sprayer	105' PTO Sprayer
Combine SP Conventional w/pickup	Small 190 HP	Large 280 HP
Tractor	160-179 HP 2WD	250-299 HP 4WD

Table 2 provides a summary of the total (fixed and operating) annual machinery costs per acre associated with the equipment listed in Table 1.

Table 2. Summary of Total Annual Machinery Costs by Machine

	Total Annual Machine Costs ($/Acre)	
Machine	Individual	Co-op Member
Air Seeder, Zero Till	5.47	3.35
Air Seeder, Minimum Till	4.72	2.77
HD Cultivator	1.15	0.88
Harrow Packer	1.76	0.88
PTO Sprayer (1 pass per year)	1.57	1.04
PTO Sprayer (2 passes per year)	1.09	0.84
Combine SP Conventional w/pickup	19.19	12.20
Tractor - Moderate Use*	12.49	6.91
Tractor - Heavy Use**	14.79	8.39

*Moderate Use = 300 hours annual use for the individual farmer and 600 hours annual use for the co-operative.
**Heavy Use = 400 hours annual use for the individual farmer and 800 hours annual use for the co-operative.

The results indicate that, on average, a mixed grain farmer with 1,500 cultivated acres can expect to save 34 percent in total machinery costs per acre by sharing a piece of machinery with at least two other farms of equal size, as opposed to owning the machine individually. The savings in total machinery costs are due to the combination of lower fixed costs per hour (an average saving of 22 percent) and reduced hours required to operate the machine (an average saving of 32 percent). These savings occur even through operating costs per hour are on average 39 percent higher per machine for a co-op member. The greater operating costs are due to the selection of larger machines suitable for a combined acreage of 4,500 acres.

Key results from comparing the costs associated with the individual machines selected include:

- a saving of approximately 40 percent in total machinery costs per acre and a 37 percent gain in field efficiency from sharing either a conventional or zero till *air seeder*,
- a 24 percent saving in total machinery costs per acre from sharing a *heavy duty cultivator*, due entirely to the greater work rate associated with a larger machine;
- a 50 percent saving in total machinery costs per acre from sharing a *harrow packer*, due primarily to significant savings in fixed costs;
- a seven dollar saving in total machine costs per acre from sharing the *combine*—the combined result of saving $28 in hourly fixed costs and requiring 30 percent less time to harvest;
- a 34 percent saving in total machinery costs per acre from sharing a *PTO sprayer* which is used for only one pass per year and a 24 percent saving for a sprayer which is used for two passes a year;
- a saving of 23 percent in total machine costs per acre from sharing a *large tractor*, assuming moderate hours of use per year (300 hours of use for the individual farmer, 600 hours of use for the co-operative).
- a saving of 36 percent in total machine costs per acre from sharing a *large tractor*, assuming heavy hours of use per year

(400 hours of use for the individual farmer, 800 hours of use for the co-operative).

The greater field efficiency of the drawn equipment suitable to the co-operative also translates into lower complement costs per farm for co-op members. Complement costs include the machinery costs of both the equipment and a compatible power unit. In all cases except for the harrow packer, the complement cost per hour were higher for the co-op member due to the larger equipment and power unit required to draw the equipment. However, complement costs per farm were on average 30 percent lower for the co-op member due to the fewer hours required to complete farm operations.

It is important to note that although the number of hours of equipment use per farmer is reduced significantly through the sharing of larger equipment, the total hours of equipment use for all members of the co-operative is still larger in each case than for the individual. For example, an individually owned combine is estimated to be used for 188 hours per year. A member of a farm machinery co-op requires the co-op's combine for only 130 hours a year. However, the combined need by all co-op members is 391 hours. As a result, the need for a larger window of opportunity for all co-op members to complete certain operations must be considered and weighed against the cost savings realized through machinery sharing. In other words, the potential loss in income from not being able to use a machine at the most optimal point in time must be compared with the cost savings realized. While this is not likely to be an issue with field preparation equipment for example, it may be with seeding and harvesting operations.

A comparison of rental costs suggests that the individual farmer would be better off renting the equipment listed in Table 1 as opposed to owning it. The one exception is the *PTO sprayer* which would be more economical to own than rent if the sprayer was used more than once a year. However, in making the decision of whether to purchase or to rent a machine or piece of equipment, farmers need to consider other factors not captured in this financial model. These additional factors include the existence of rental agents nearby, the availability of required equipment and the cost of transporting the equipment to the farm.

Cost Comparisons by Machinery Set

The costs associated with owning a set of machinery typically used under a direct seeding system are compared with the costs associated with co-operatively owning the same set of machinery. The costs associated with a set of machinery typically used under a conventional seeding system are also compared.

Key results from the comparison of machinery sets include:

- Under a *conventional seeding system* annual fixed costs are 45 percent lower and operating costs are 14 percent lower for the co-op member. As a result, total annual machinery costs are 36 percent lower for the co-op member than for the individual owner.
- The combination of lower fixed costs and lower operating costs translate into an estimated overall saving in total annual machinery costs of 33 percent for a co-op member versus an individual farmer-owner under a *direct seeding system.*

Methodology

Farm Size

Each farm operation is assumed to be a mixed grain farm of 1,500 acres. It is assumed that the co-operative is composed of three individual farm operators with 1,500 acres each.

Size of Machines and Equipment

The size of the machines compared vary according to whether they are being used by an individual farmer or by a farm machinery co-operative. As a result, the size of machinery chosen for the co-operative corresponds to the needs of a 4,500 acre mixed grain farm. The size of farm machinery for the individual farmer is

selected according to the typical choice for a mixed grain farm of 1,500 cultivated acres. Machinery selection is based on: (a) interviews with members of Saskatchewan farm machinery co-operatives; and (b) information contained in selected publications put out by the Saskatchewan Ministry of Agriculture and Food.

Time Requirement

The annual hours of machinery use for all machines except the tractors is calculated according to the work rate for the size of machine selected as published in Saskatchewan Agriculture and Food's *Farm Machinery Custom and Rental Rate Guide 1998.* For example, the work rate for a small 190 HP self propelled conventional combine with pickup is reported as eight acres per hour. An individual farmer with 1,500 acres will therefore use the combine for an estimated 187.50 hours per year.

Fixed, Operating and Total Machine Costs

The basis for calculating the machine cost data is the cost of new equipment as reported in Saskatchewan Agriculture and Food's *Farm Machinery Custom and Rental Rate Guide 1998.* In calculating costs:

- Total Fixed Costs (TFC) are the sum of depreciation, investment costs, and insurance and housing costs. Fixed costs are calculated on a per hour basis and then multiplied by the annual hours used to get the Total Fixed Costs per farmer or co-op member and Total Fixed Costs per farm or co-op.
- Total operating costs (TOC) per hour include repair costs and, in the case of self propelled machines, fuel, lube and oil costs.
- Total machinery costs (TMC) are the sum of fixed costs and operating costs. They are calculated on a per hour, per acre, per farmer/member, and per farm/co-op basis. Per farmer/member calculations are the TMC per hour multiplied by the hours of use per farmer. Per farm and per co-op calculations are the TMC per hour multiplied by the hours of use by the individual farm and by the total hours used by all the members of the co-op, respectively.

Rental Costs

In the comparison of selected equipment, average rental costs are presented. For drawn equipment the rental costs are the average rental rates as presented in Saskatchewan Agriculture and Food's *Farm Machinery Custom and Rental Rate Guide 1998.* The rental rates include fixed costs, repair costs and a 15 percent margin to cover risk, profit and management for the rental agent. In the case of powered equipment, the rental costs also include fuel, oil and lubrication costs as these are the responsibility of the renter.

The rental costs are specific to each piece of equipment. If a complement (tractor and machine) is rented, the rental costs would be the total of the two machine rental costs. The rental costs associated with various types of tractors are provided in Appendix B.

Complement Costs

In the comparison of drawn equipment, the complement costs (total machinery cost of the equipment plus power unit costs) are calculated and presented as an hourly rate. Power unit costs include the average fixed and operating costs associated with a power unit suitable to the drawn machine. In each case the average fixed costs for the power unit are based on an estimated 600 hours of use per year. The complement costs per farm are calculated by taking the hourly complement cost and multiplying it by the number of hours required to complete the operation for the individual farmer or co-op member.

Cost Comparison of Selected Equipment

In this section the cost comparisons of selected, individual machines are summarized.

Air Seeder, Conventional

Air seeders used under a conventional seeding system are equipped with sweep-type openers using an air system to deliver the seed and

fertilizer. This type of seeder is typically preceded by a cultivator and followed by a harrow packer. The speed used in calculating the work rate for minimum till air seeders is approximately 5.5 mph.

In Table 3 the cost of owning a 28 - 30 foot conventional air seeder as an individual farmer is compared with the cost of owning a 46 - 47 foot air seeder as a member of a co-operative.

Total fixed costs per farmer are 47 percent lower for the co-op member than the individual owner. Total operating costs per farmer are 18 percent lower for the co-op member than the individual owner. The co-op member requires the air seeder for only 70 hours, compared to 111 hours for the individual farmer, due to greater field efficiency. The lower time requirement for the co-op member results in a 41 percent saving in total machinery costs. On a per acre basis, the individual farmer pays $4.72 per acre, while the co-op member pays $2.77. In comparing rental costs with total machinery costs, the individual farmer would be better off renting an air seeder as he or she would save 19 percent in machinery costs.

The larger air seeder results in approximately 37 percent less time required to seed each farm. However, total annual hours of use are estimated at 209 for the co-op, versus 111 for the individual farm. This result implies that the co-op will need to rely on a greater number of workdays than an individual farmer, to ensure that all fields are seeded in a timely fashion.

A power unit of approximately 170 HP is required for the small air seeder, while a power unit of approximately 250 HP is required to draw the large air seeder. The hourly costs of owning and operating both the air seeder and a compatible power unit are approximately the same for both the individual farmer and the co-operative member. However, because the co-op member requires less time to seed his or her fields, the complement costs per farm are 37 percent lower for the co-op member.

Table 3. Cost Comparison - Air Seeder, Conventional

		Individual Farmer	*Co-op Member*
Number of Farms/Members		1	3
Acreage per Farm		1,500	1,500
Total Acres		1,500	4,500
Equipment			
Type		28' - 30' Air Seeder	46'-47' Air Seeder
Original Cash Cost		58,600	76,600
Salvage Value		5,860	7,660
Years Lifetime		17.00	12.00
Repair Cost Factor		0.20	0.20
Time Requirement			
Work Rate	acres per hour	13.50	21.50
Annual Hrs. Use	total	111.11	209.30
Annual Hrs. Use	per farm	111.11	69.77
Fixed Costs			
Depreciation	per hour	27.92	27.45
Investment Cost	per hour	18.85	13.08
Insurance & Housing	per hour	5.27	3.66
TFC	per hour	52.05	44.19
TFC	per farm	5,783.30	3,083.15
TFC	per farm or co-op	5,783.30	9,249.45
Operating Costs			
Repair Costs	per hour	11.72	15.32
TOC	per hour	11.72	15.32
TOC	per farm	1,302.22	1,068.84
TOC	per farm or co-op	1,302.22	3,206.51
Total Machine Costs			
TMC	per hour	63.77	59.51
TMC	per farm	7,085.53	4,151.99
TMC	per farm or co-op	7,085.53	12,455.96
TMC	per acre	4.72	2.77
Rental Cost (Air Seeder Only - Based on 200 hours annual use)			
Rental Cost	per hour	51.36	67.13
Rental Cost	per farm	5,706.67	4,683.49
Rental Cost	per acre	3.80	1.04
Complement Costs (TMC + Power Unit Costs)			
Complement Cost	per hour	110.85	111.30
Complement Cost	per farm	12,316.64	7,765.24
Complement Cost	per acre	8.21	1.73

Air Seeder, Zero Till

Zero till air seeders are capable of seeding directly into untilled soil using narrow openers to minimize soil disturbance. Table 4 summarizes the costs associated with owning and operating a 28 - 30 foot zero till air seeder as an individual farmer compared with the costs of co-operatively owning and operating a 46 - 47 foot zero till air seeder. The speed used in the work rate calculation for zero till air seeders is approximately 4.5 mph.

While there is only a 2 percent difference in total machine costs per hour between the co-op member and the individual farmer in this comparison, the co-op member requires the air seeder for only 86 hours, compared to 136 hours for the individual farmer, due to greater field efficiency. The lower time requirement for the co-op member results in a 39 percent saving in total machinery costs. On a per acre basis, the individual farmer pays $5.47 per acre, while the co-op member pays $3.35. In comparing rental costs with total machinery costs, the individual farmer would be better off renting an air seeder as he or she would save 5 percent in machinery costs.

The larger air seeder results in approximately 37 percent less time required to seed each farm. However, total annual hours of use are estimated at 257 for the co-op, versus 136 for the individual farm. This result implies that a greater number of workdays are required by the co-op to ensure that all of its members can seed their fields in a timely fashion.

A power unit of approximately 170 HP is required for the small air seeder, while a power unit of approximately 250 HP is required to draw the large air seeder. The hourly costs of owning and operating both the air seeder and a compatible power unit are slightly (3 percent) higher for the co-operative member than the individual farmer. However, because the co-op member requires 37 percent less time to seed his or her fields, the complement costs per farm are 35 percent lower for the co-op member.

Table 4. Cost Comparison - Air Seeder, Zero Till

		Individual Farmer	*Co-op Member*
Number of Farms/Members		1	3
Acreage per Farm		1,500	1,500
Total Acres		1,500	4,500
Equipment			
Type		28' - 30' Air Seeder	46'-47' Air Seeder
Original Cash Cost		65,100	87,600
Salvage Value		6,510	8,760
Years Lifetime		17.00	12.00
Repair Cost Factor		0.20	0.20
Time Requirement			
Work Rate	acres per hour	11.00	17.50
Annual Hrs. Use	total	136.36	257.14
Annual Hrs. Use	per farm	136.36	85.71
Fixed Costs			
Depreciation	per hour	25.27	25.55
Investment Cost	per hour	17.07	12.18
Insurance & Housing	per hour	4.77	3.41
TFC	per hour	47.12	41.14
TFC	per farm	6,424.80	3,525.90
TFC	per farm or co-op	6,424.80	10,577.70
Operating Costs			
Repair Costs	per hour	13.02	17.52
TOC	per hour	13.02	17.52
TOC	per farm	1,775.45	1,501.71
TOC	per farm or co-op	1,775.45	4,505.14
Total Machine Costs			
TMC	per hour	60.14	58.66
TMC	per farm	8,200.25	5,027.61
TMC	per farm or co-op	8,200.25	15,082.84
TMC	per acre	5.47	3.35
Rental Cost (Air Seeder Only - Based on 200 hours annual use)			
Rental Cost	per hour	57.05	76.77
Rental Cost	per farm	7,779.55	6,580.29
Rental Cost	per acre	5.19	1.46
Complement Costs (TMC + Power Unit Costs)			
Complement Cost	per hour	107.22	110.45
Complement Cost	per farm	14,620.25	9,466.76
Complement Cost	per acre	9.75	2.10

Heavy Duty Cultivator

Table 5 summarizes the cost of individually owning a 34 - 35 foot heavy duty cultivator compared with co-operatively owning a 58 - 60 foot heavy duty cultivator.

It is assumed that the cultivator is used twice a year by each farmer. The smaller cultivator has an estimated work rate of 17.5 acres per hour, while the larger cultivator is expected to cultivate 29.5 acres per hour. The annual hours of used for the individual farm are estimated at 171. The co-op member is expected to use the larger cultivator for 101 hours a year.

Total fixed costs are 34 percent lower for the co-op member than the individual farmer. Total operating costs per hour for the co-op farmer are almost double. However, because the co-op member uses the cultivator for fewer hours, total operating costs per farm are about the same.

Because of the greater field efficiency of the larger cultivator, total machine costs per farm are 24 percent lower for the co-op member than the individual farmer, even though per hour total machine costs are 28 percent higher for the co-op member. On a per acre basis, the individual farmer pays $1.15 per acre in total machine costs while the co-op member pays $0.88 per acre. In comparing rental costs, the individual farmer would be only slightly better off renting a cultivator, as this would save $208 (or 6 percent) in machinery costs.

The greater field efficiency of the larger cultivator also results in lower complement costs per farm for the co-op member, even though the co-op member's per hour complement costs are $17 higher. The higher per hour complement costs are due to the fact that the large cultivator requires a 250 HP power unit, while the small cultivator requires a power unit of only 150 HP.

Table 5. Cost Comparison - Heavy Duty Cultivator

		Individual Farmer	*Co-op Member*
Number of Farms/Members		1	3
Acreage per Farm		1,500	1,500
Total Acres		3,000	9,000
Equipment			
Type		34'-35' HD Cultivator	58'-60' HD Cultivator
Original Cash Cost		25,600	44,500
Salvage Value		2,560	4,450
Years Lifetime		17.50	14.00
Repair Cost Factor		0.2200	0.2200
Time Requirement			
Work Rate	acres per hour	17.50	29.50
Annual Hrs. Use	total	171.43	305.08
Annual Hrs. Use	per farm	171.43	101.69
Fixed Costs			
Depreciation	per hour	7.68	9.38
Investment Cost	per hour	5.34	5.21
Insurance & Housing	per hour	1.49	1.46
TFC	per hour	14.51	16.05
TFC	per farm	2,487.77	1,632.20
TFC	per farm or co-op	2,487.77	4,896.59
Operating Costs			
Repair Costs	per hour	5.63	9.79
TOC	per hour	5.63	9.79
TOC	per farm	965.49	995.59
TOC	per farm or co-op	965.49	2,986.78
Total Machine Costs			
TMC	per hour	20.14	25.84
TMC	per farm	3,453.26	2,627.79
TMC	per farm or co-op	3,453.26	7,883.37
TMC	per acre	1.15	0.88
Rental Cost (Cultivator Only - Based on 250 hours annual use)			
Rental Cost	per hour	18.93	32.91
Rental Cost	per farm	3,245.14	3,346.78
Rental Cost	per acre	1.08	0.37
Complement Costs (TMC + Power Unit Costs)			
Complement Cost	per hour	60.13	77.63
Complement Cost	per farm	10,308.69	7,894.57
Complement Cost	per acre	3.44	0.88

Harrow Packer

The cost of individually owning a 70 foot harrow packer is compared with co-operatively owning an 80 foot harrow packer in Table 6. The smaller harrow packer has an estimated work rate of 35 acres per hour, while the larger harrow packer has an expected work rate of 40 acres per hour.

It is estimated that the individual farmer requires the smaller harrow packer for 43 hours a year. The co-op member is calculated to use the larger harrow packer for 38 hours a year. Total operating costs per hour are 12 percent higher for the co-op member. However, due to greater field efficiency the total operating costs of both the individual farmer and the co-op member are almost equal.

Total fixed costs are 56 percent lower for the co-op member than the individual farmer. This is primarily due to the significant savings in depreciation and investment costs. Total machine costs per farmer are therefore 50 percent lower for the co-op member than the individual farmer. On a per acre basis, the individual farmer pays $1.76 per acre in total machine costs while the co-op member pays $0.88 per acre. The average rental costs for a 70 foot harrow packer indicate that the individual farmer would likely be better off renting rather than owning, as this could save an estimated 39 percent in machinery costs.

A power unit of approximately 170 HP is required to draw the smaller harrow packer, while the larger harrow packer requires a 185 HP power unit. The per hour complement costs are 19 percent lower for the co-op member than the individual farmer, resulting in a 29 percent saving for the co-op member's farm.

Table 6. Cost Comparison - Harrow Packer

		Individual Farmer	*Co-op Member*
Number of Farms/Members		1	3
Acreage per Farm		1,500	1,500
Total Acres		1,500	4,500
Equipment			
Type		70' Harrow Packer	80' Harrow Packer
Original Cash Cost		25,800	29,000
Salvage Value		2,580	2,900
Years Lifetime		20.00	15.00
Repair Cost Factor		0.2700	0.2700
Time Requirement			
Work Rate	acres per hour	35.00	40.00
Annual Hrs. Use	total	42.86	112.50
Annual Hrs. Use	per farm	42.86	37.50
Fixed Costs			
Depreciation	per hour	27.09	15.47
Investment Cost	per hour	21.52	9.22
Insurance & Housing	per hour	6.02	2.58
TFC	per hour	54.63	27.26
TFC	per farm	2,341.35	1,022.25
TFC	per farm or co-op	2,341.35	3,066.75
Operating Costs			
Repair Costs	per hour	6.97	7.83
TOC	per hour	6.97	7.83
TOC	per farm	298.54	293.63
TOC	per farm or co-op	298.54	880.88
Total Machine Costs			
TMC	per hour	61.60	35.09
TMC	per farm	2,639.89	1,315.88
TMC	per farm or co-op	2,639.89	3,947.63
TMC	per acre	1.76	0.88
Rental Cost (Harrow Packer Only - Based on 100 hours annual use)			
Rental Cost	per hour	37.29	41.92
Rental Cost	per farm	1,598.14	1,572.00
Rental Cost	per acre	1.07	0.35
Complement Costs (TMC + Power Unit Costs)			
Complement Cost	per hour	108.68	88.37
Complement Cost	per farm	4,657.61	3,313.88
Complement Cost	per acre	3.11	0.74

Sprayer, PTO

The cost of individually owning a 60 foot (400-500 gallon) PTO sprayer are compared with co-operatively owning an 105 foot (700-800 gallon) PTO sprayer. The 60 foot sprayer has an estimated work rate of 27 acres per hour, while the 105 foot sprayer has an average work rate of 41 acres per hour. A power unit of approximately 65 HP is required to draw the smaller sprayer, while the larger sprayer typically requires a 85 HP power unit. The cost of hauling water for field spraying is not included in the analysis.

The costs associated with the sprayer are compared under two different scenarios. Under the first scenario, the sprayer is used once a year (one field pass). This scenario corresponds to farms which use a conventional seeding system, where fields are cultivated and harrow packed, in addition to being sprayed. Under the second scenario, it is assumed that the sprayer is used twice a year, as is typical for direct seeding systems.

Under the first scenario, summarized in Table 7, it is estimated that the individual farmer requires the 60 foot sprayer for 56 hours a year. The co-op member is calculated to use a 105 foot sprayer 37 hours a year. Although the total machine costs per hour are the same for the co-op member as the individual farmer, the total machine costs per acre are much (34 percent) lower due to greater field efficiency. The individual farmer is estimated to spend $2,359 per year to own the smaller sprayer, while the co-op member spends $1,565 per year by jointly owning the larger sprayer with two other farmers.

In comparing the cost of renting sprayer, the individual farmer is estimated to save 26 percent in machinery costs by renting as opposed to owning. The co-op member is slightly better off by owning the sprayer in co-operation when compared with renting.

Although the per hour costs of owning and operating the sprayer and tractor required to pull it are higher for the co-op member, the greater field efficiency of the larger sprayer translates into lower per farm complement costs for the co-op member. The per farm complement costs are 27 percent lower for the co-op member than the individual farmer.

Under the second scenario, summarized in Table 8, it is estimated that the individual farmer requires the 60 foot sprayer for 111 hours a year. The co-op member is calculated to use a 105 foot sprayer 73 hours a year. Although the total machine costs per hour for the co-op member are 16 percent higher than those of the individual farmer, the total machine costs per acre are 23 percent lower due to greater field efficiency. The individual farmer is estimated to spend $3,283 per year to own and use the smaller sprayer twice a year, while the co-op member spends $2,514 per year on jointly sharing the larger sprayer with two other farmers.

In this case, because the sprayer is used twice a year, neither the individual farmer nor the co-op member would be better off renting the same equipment.

As was the case in the first scenario, the per hour complement costs are higher for the co-op member than the individual farmer. However, because of the greater field efficiency of the larger sprayer, the per farm complement costs are 18 percent lower for the co-op member than the individual farmer.

Table 7. Cost Comparison - PTO Sprayer (1 pass per year)

		Individual Farmer	Co-op Member
Number of Farms/Members		1	3
Acreage per Farm		1,500	1,500
Total Acres		1,500	4,500
Equipment			
Type		60' PTO Sprayer	105' PTO Sprayer
Original Cash Cost		17000	24400
Salvage Value		1700	2440
Years Lifetime		14.00	10.00
Repair Cost Factor		0.5167	0.5167
Time Requirement			
Work Rate	acres per hour	27.00	41.00
Annual Hrs. Use	total	55.56	109.76
Annual Hrs. Use	per farm	55.56	36.59
Fixed Costs			
Depreciation	per hour	19.67	20.01
Investment Cost	per hour	10.94	7.95
Insurance & Housing	per hour	3.06	2.22
TFC	per hour	33.67	30.18
TFC	per farm	1,870.61	1,104.10
TFC	per farm or co-op	1,870.61	3,312.30
Operating Costs			
Repair Costs	per hour	8.78	12.61
TOC	per hour	8.78	12.61
TOC	per farm	487.99	461.25
TOC	per farm or co-op	487.99	1,383.75
Total Machine Costs			
TMC	per hour	42.45	42.79
TMC	per farm	2,358.60	1,565.35
TMC	per farm or co-op	2,358.60	4,696.05
TMC	per acre	1.57	1.04
Rental Cost (Sprayer Only - Based on 120 hours annual use)			
Rental Cost	per hour	31.52	45.24
Rental Cost	per farm	1,751.11	1,655.12
Rental Cost	per acre	1.17	0.37
Complement Costs (TMC + Power Unit Costs)			
Complement Cost	per hour	58.13	64.52
Complement Cost	per farm	3,229.71	2,360.35
Complement Cost	per acre	2.15	0.52

Table 8. Cost Comparison - PTO Sprayer (2 passes per year)

		Individual Farmer	Co-op Member
Number of Farms/Members		1	3
Acreage per Farm		1,500	1,500
Total Acres		3,000	9,000
*Equipment**			
Type		60' PTO Sprayer	105' PTO Sprayer
Original Cash Cost		17000	24400
Salvage Value		1700	2440
Years Lifetime		10.00	6.00
Repair Cost Factor		0.5167	0.5167
Time Requirement			
Work Rate	acres per hour	27.00	41.00
Annual Hrs. Use	total	111.11	219.51
Annual Hrs. Use	per farm	111.11	73.17
Fixed Costs			
Depreciation	per hour	13.77	16.67
Investment Cost	per hour	5.47	3.97
Insurance & Housing	per hour	1.53	1.11
TFC	per hour	20.77	21.76
TFC	per farm	2,307.75	1,592.10
TFC	per farm or co-op	2,307.75	4,776.30
Operating Costs			
Repair Costs	per hour	8.78	12.61
TOC	per hour	8.78	12.61
TOC	per farm	975.99	922.50
TOC	per farm or co-op	975.99	2,767.50
Total Machine Costs			
TMC	per hour	29.55	34.37
TMC	per farm	3,283.74	2,514.60
TMC	per farm or co-op	3,283.74	7,543.80
TMC	per acre	1.09	0.84
Rental Cost (Sprayer Only - Based on 120 hours annual use)			
Rental Cost	per hour	31.52	45.24
Rental Cost	per farm	3,502.22	3,310.24
Rental Cost	per acre	1.17	0.37
Complement Costs (TMC + Power Unit Costs)			
Complement Cost	per hour	45.23	56.10
Complement Cost	per farm	5,025.96	4,104.60
Complement Cost	per acre	1.68	0.46

Combine

The cost of individually owning a small 190 HP self-propelled conventional combine with pickup is compared with co-operatively owning a large 280 HP self-propelled conventional combine with pickup. The results from this comparison are summarized in Table 9.

The smaller combine has an estimated work rate of 8 acres per hour, while the larger combine has an estimated work rate of 11.5 acres per hour. The annual combine use for the individual farmer with 1,500 acres is therefore estimated at 188 hours. The co-op member, also with 1,500 acres, is expected to require the larger combine for 130 hours a year. The total annual use of the larger combine is 391 hours to cover all three members' combining requirements.

Total fixed costs per hour are 27 percent lower for the co-op member than the individual farmer. Total operating costs per hour for the co-op farmer are 46 percent higher than for the individual farmer. However, because the co-op member uses the combine for fewer hours a year, total machine costs are $18,303 per year for the co-op member and $28,787 per year for the individual farmer. On a per acre basis, the individual farmer pays $19 per acre for the small combine, while the co-op member pays $12 per acre.

The average rental cost for a 190 HP combine is $130 per hour, which works out to a total cost of $24,382 for the individual farmer. The individual farmer could therefore expect to save 15 percent by renting a combine as opposed to owning one. The rental cost for a 280 HP combine is $148 per hour. For the co-op member, it is therefore cheaper to own a combine co-operatively rather than renting one.

Table 9. Cost Comparison - Combine SP Conventional

		Individual Farmer	*Co-op Member*
Number of Farms/Members		1	3
Acreage per Farm		1,500	1,500
Total Acres		1,500	4,500
Equipment			
Type		Small 190 HP	Large 280 HP
Original Cash Cost		156,500.00	191,900.00
Salvage Value		15,650.00	19,190.00
Years Lifetime		11.00	8.00
Repair Cost Factor		0.2133	0.2133
Time Requirement			
Work Rate	acre per hour	8.00	11.50
Annual Hrs. Use	total	187.50	391.30
Annual Hrs. Use	per farm	187.50	130.43
Fixed Costs			
Depreciation	per hour	68.29	55.17
Investment Cost	per hour	29.84	17.53
Insurance & Housing	per hour	8.35	4.90
TFC	per hour	106.48	77.61
TFC	per farm	19,964.42	10,122.73
TFC	per farm or co-op	19,964.42	30,368.18
Operating Costs			
Repair Costs	per hour	33.38	40.93
Fuel Cost	per hour	13.00	20.80
Lube & Oil Cost	per hour	0.67	0.98
TOC	per hour	47.05	62.71
TOC	per farm	8,822.15	8,179.86
TOC	per farm or co-op	8,822.15	24,539.58
Total Machine Costs			
TMC	per hour	153.53	140.32
TMC	per farm	28,786.57	18,302.59
TMC	per farm or co-op	28,786.57	54,907.76
TMC	per acre	19.19	12.20
Rental Cost (Based on 350 hours annual use)			
Rental Cost	per hour	130.04	148.22
Rental Cost	per farm	24,382.50	19,333.04
Rental Cost	per acre	16.26	4.30

Tractors

Table 10 outlines the total machine costs per hour of various sizes of tractors under different assumptions of annual hours of use. The figures clearly indicate that the more a tractor is used in a year, the less it costs to own and operate.

Table 10. Total Machine Cost Comparison - Tractors

Machine Size	*Original Cost*	Total Machine Cost Per Hour *Annual Hours of Use*				
		200	*300*	*400*	*600*	*800*
60-69 HP 2WD	33,600	24.49	20.48	18.30	15.68	14.45
80-89 HP 2WD	49,600	34.73	28.80	25.59	21.73	19.91
140-159 HP 2WD	93,800	64.57	53.37	47.29	39.99	36.55
160-179 HP 2WD	107,700	75.31	62.45	55.47	47.08	43.13
180+ HP 2WD	118,100	84.24	70.13	62.49	53.28	48.96
250-299 HP 4WD	125,600	84.72	69.72	61.58	51.79	47.19

While it is difficult to estimate the total number of hours a farmer will use a tractor in a given year, we can assume that:

a) a tractor owned co-operatively will be used for a greater number of hours per year than one which is owned by an individual;
b) according to the equipment cost comparisons illustrated earlier, a farmer who belongs to a co-operative in which all major pieces of farm equipment are shared can expect to spend, on average, 32 percent less time completing farm operations;
c) a co-operative requires a larger tractor than that required by an individual in order to draw the size of equipment suitable for a larger land base.

Based on the above assumptions, Tables 11 and 12 illustrate cost comparisons for a 160-179 HP 2WD tractor owned by an individual farmer versus the costs of owning a 250-299 HP 4WD tractor co-operatively. In Table 11, a moderate rate of use is assumed with a total of 300 hours of annual use assumed for the individual farmer and a total of 600 hours of annual use assumed for the co-operative (200 hours per member per year). Table 12 assumes heavier rate of annual use with a total of 400 hours assumed for the individual farmer and a total of 800 hours for the co-operative (approximately 267 hours per member per year).

Table 11. Cost Comparison - Large Tractor, Moderate Use*

		Individual Farmer	*Co-op Member*
Number of Farms/Members		1	3
Acreage per Farm		1,500	1,500
Total Acres		1,500	4,500
Annual Hrs. Use	total	300.00	600.00
Annual Hrs. Use	per farmer	300.00	200.00
Tractor			
Type		160-179 HP 2WD	250-299 HP 4WD
Original Cash Cost		107,700.00	125,600.00
Salvage Value		10,770.00	12,560.00
Years Lifetime		16.50	13.00
Repair Cost Factor		0.0517	0.0433
Fixed Costs			
Depreciation	per hour	19.58	14.49
Investment Cost	per hour	12.83	7.48
Insurance & Housing	per hour	3.59	2.09
TFC	per hour	36.01	24.07
TFC	per farm	10,801.82	4,813.86
TFC	per farm or co-op	10,801.82	14,441.58
Operating Costs			
Repair Costs	per hour	5.57	5.44
Fuel Cost	per hour	20.28	21.32
Lube & Oil Cost	per hour	0.60	0.96
TOC	per hour	26.45	27.72
TOC	per farm	7,934.43	5,543.70
TOC	per farm or co-op	7,934.43	16,631.09
Total Machine Costs			
TMC	per hour	62.45	51.79
TMC	per farm	18,736.25	10,357.56
TMC	per farm or co-op	18,736.25	31,072.67
TMC	per acre	12.49	6.91
Rental Cost (Based on 800 hours annual use)			
Rental Cost	per hour	46.48	50.93
Rental Cost	per farm	13,944.00	10,186.00
Rental Cost	per acre	9.30	2.26

*300 hours annual use for the individual farmer and 600 hours annual use for the co-operative.

Table 12. Cost Comparison - Large Tractor, Heavy Use

		Individual Farmer	*Co-op Member*
Number of Farms/Members		1	3
Acreage per Farm		1,500	1,500
Total Acres		1,500	4,500
Annual Hrs. Use	total	400.00	800.00
Annual Hrs. Use	per farmer	400.00	266.67
Tractor			
Type		160-179 HP 2WD	250-299 HP 4WD
Original Cash Cost		107,700.00	125,600.00
Salvage Value		10,770.00	12,560.00
Years Lifetime		14.50	11.50
Repair Cost Factor		0.0517	0.0433
Fixed Costs			
Depreciation	per hour	16.71	12.29
Investment Cost	per hour	9.63	5.61
Insurance & Housing	per hour	2.69	1.57
TFC	per hour	29.03	19.47
TFC	per farm	11,612.10	5,191.92
TFC	per farm or co-op	11,612.10	15,575.77
Operating Costs			
Repair Costs	per hour	5.57	5.44
Fuel Cost	per hour	20.28	21.32
Lube & Oil Cost	per hour	0.60	0.96
TOC	per hour	26.45	27.72
TOC	per farm	10,579.24	7,391.59
TOC	per farm or co-op	10,579.24	22,174.78
Total Machine Costs			
TMC	per hour	55.48	47.19
TMC	per farm	22,191.34	12,583.52
TMC	per farm or co-op	22,191.34	37,750.55
TMC	per acre	14.79	8.39
Rental Cost (Based on 800 hours annual use)			
Rental Cost	per hour	46.48	50.93
Rental Cost	per farm	18,592.00	13,598.31
Rental Cost	per acre	12.39	3.02

*400 hours annual use for the individual farmer and 800 hours annual use for the co-operative.

Under the scenario illustrated in Table 11, the hourly operating costs are slightly higher for the co-op member than the individual farmer due to the larger tractor owned by the co-operative. However, the co-op member's share of the fixed costs associated with the larger tractor is lower than the fixed costs facing the individual farmer. As a result, the total machine costs per hour are 17 percent lower for the co-op member than the individual farm, translating into a 45 percent saving in total machinery costs per farm for the co-op member when compared with the per farm costs of the individual farmer.

Similarly, under the second scenario shown in Table 12, the total machine costs per hour are 15 percent lower for the co-op member. The total machine costs per farm are 43 percent lower for the co-op member than for the individual farmer.

In both scenarios the lower rental costs per hour suggest that the individual farmer may be better off renting a tractor as opposed to owning one as a sole proprietor. In the first scenario, the co-op member may also realize a slight savings by renting a tractor rather than owning one as part of the co-operative. However, it is doubtful that a saving of less than one dollar per hour of use could offset the convenience of ownership.

Cost Comparison of Machinery Sets

In this section the costs associated with individually owning and using a typical machinery set are compared with the costs of owning a similar machinery set co-operatively. Two types of machinery sets are compared. The first machinery set corresponds to mixed grain production based on a conventional seeding system. The second machinery set corresponds to mixed grain production based on direct seeding.

Machinery Set for Conventional Seeding

Table 13 outlines the machines included in the machinery complement set for a conventional seeding operation. Under a conventional seeding system, the tillage equipment is required to prepare the seedbed and pack the ground once the field has been seeded. For this reason a heavy duty cultivator and a harrow packer are included. It is assumed that a minimum till air seeder is used and that a PTO sprayer is also used for one field pass.

Two tractors, a large and a small one, are also included in the machinery set. The size of the tractors is based on farm interviews and the power needs of the equipment included in the set. For the individual farmer the large tractor is assumed to draw the air seeder, cultivator and harrow packer. The small tractor is assumed to draw the sprayer. For the co-operative, the large tractor is assumed to draw the air seeder and cultivator. The smaller, two wheel drive tractor is assumed to draw the harrow packer and the sprayer.

Both tractors are assumed to be used only for the operations included in our analysis (i.e., seeding, tilling and spraying). Therefore the total hours for the individual farmer are estimated as 325 hours for the large tractor, and 55 for the small tractor. The total hours for the co-operative are estimated at 514 hours for the large tractor and 222 for the small tractor. The cost comparisons of the two tractors under these assumptions are provided in the Technical Appendix.

As was illustrated in Table 10, total machine costs per hour drop significantly for tractors the greater the number of annual hours of use. Therefore, one can expect tractor costs to be less if other operations, such as hauling water for spraying fields, are considered.

Table 13. Machinery Set - Conventional Seeding

	Individual	Co-operative
Large Tractor	160-179 HP 2WD	250-299 HP 4WD
Small Tractor	60-69 HP 2WD	180+ HP 2WD
Air Seeder, Minimum Till	28' - 30' Air Seeder	46'-47' Air Seeder
HD Cultivator	34'-35' HD Cultivator	58'-60' HD Cultivator
Harrow Packer	70' Harrow Packer	80' Harrow Packer
PTO Sprayer	60' PTO Sprayer	105' PTO Sprayer
Combine SP Conventional with pickup	Small 190 HP	Large 280 HP

Table 14 summarizes the estimated costs associated with the machinery set laid out in Table 13. For the individual farmer total replacement cost (original purchase price) of the machines listed is $424,800. The purchase price of the co-operative machinery set is estimated at $610,100. The co-op member's share of the co-operative machinery set is $203,367.

Table 14. Machinery Set Costs - Conventional Seeding

	Individual Farmer	Co-op Member	Co-op Total
Total Replacement Cost ($)	424,800	203,367	610,100
Annual Fixed Costs ($)	45,996	25,108	75,325
Annual Operating Costs ($)	20,981	18,017	54,050
Total Annual Machinery Costs ($)	66,977	43,125	129,375
Total Annual Machinery Costs Per Acre ($/acre)	44.65	28.75	28.75

The difference in capital outlay translates into a savings of 45 percent in annual fixed costs for the co-op member when compared to the individual farmer. Annual operating costs are 14 percent lower for the co-op member than the individual farmer. Overall, total annual machinery costs are 36 percent lower for the co-op member than for the individual owner.

Machinery Set for Direct Seeding

Table 15 outlines the machines included in the machinery complement set for a direct seeding operation. Tillage equipment is not required under a direct seeding system. However, increased machinery costs are associated with the additional use of a sprayer. For this reason it is assumed that the PTO sprayer is assumed to be used for two field passes. It is assumed that a zero till air seeder is used for seeding and a conventional self-propelled combine is used for harvest.

Table 15. Machinery Set - Direct Seeding

	Individual	Co-operative
Large Tractor	160-179 HP 2WD	250-299 HP 4WD
Small Tractor	60-69 HP 2WD	180+ HP 2WD
Air Seeder, Zero Till	28' - 30' Air Seeder	46'-47' Air Seeder
PTO Sprayer	60' PTO Sprayer	105' PTO Sprayer
Combine SP Conventional with pickup	Small 190 HP	Large 280 HP

Two tractors, a large and a small one, are included in the machinery set. The size of the tractors is based on farm interviews and the power needs of the other machinery included in the set. In both the individual and the co-operative case the large tractor is used to draw the air seeder and the small tractor is used to draw the sprayer.

Both tractors are assumed to be used only for the operations included in this analysis (i.e., seeding and spraying). The total hours for the individual farmer are estimated as 136 hours for the large tractor, and 111 for the small tractor. The total hours for the co-operative are estimated at 257 hours for the large tractor and 219 for the small tractor. The cost comparisons of the two tractors under these assumptions are provided in the Technical Appendix included at the back of this booklet.

As was illustrated in Table 10, total machine costs per hour drop significantly for tractors the greater the number of annual hours of use. Therefore, one can expect tractor costs to be less if other operations, such as hauling water for spraying fields, are considered.

Table 16 summarizes the estimated costs associated with the machinery set laid out in Table 19. Total replacement cost (original cash value) of the machines listed in Table 19 is $379,900 for the individual farmer. The co-operative's replacement costs are estimated at $547,600, due to the assumed purchase of larger. The co-op member's share of the co-op's machinery set is $182,533.

Table 16. Machinery Set Costs - Direct Seeding

	Individual Farmer	Co-op Member	Co-op Total
Total Replacement Cost ($)	379,900	182,533	547,600
Annual Fixed Costs ($)	40,691	22,822	68,466
Annual Operating Costs ($)	16,197	15,216	45,649
Total Annual Machinery Costs ($)	56,888	38,038	114,115
Total Annual Machinery Costs Per Acre ($/acre)	37.93	25.36	25.36

The difference in capital outlay by the co-op member compared to the individual owner translates into a savings of 44 percent in annual fixed costs for the co-op member. Total operating costs are also slightly (6 percent) lower for the co-op member than the individual farmer.

The combination of lower fixed costs and lower operating costs translate into an overall saving in total annual machinery costs of 33 percent associated with the sharing of farm machinery under in a direct seeding system.

Table A. Cost Comparison - Tractors, Conventional Seeding System

		Large Tractor		Small Tractor	
		Individual Farmer	*Co-op Member*	*Individual Farmer*	*Co-op Member*
Number of Farms/Members		1	3	1	3
Acreage per Farm		1,500	1,500	1,500	1,500
Total Acres		1,500	4,500	1,500	4,500
Equipment					
Type		160-179 HP 2WD	250-299 HP 4WD	60-69 HP 2WD	180+ HP 2WD
Original Cash Cost		107,700.00	125,600.00	33,600.00	118,100.00
Salvage Value		10,770.00	12,560.00	3,360.00	11,810.00
Years Lifetime		16.50	13.75	25.00	21.00
Repair Cost Factor		0.0517	0.0433	0.0517	0.0517
Time Requirement					
Work Rate					
Annual Hrs. Use	total	325.00	514.00	55.00	222.00
Annual Hrs. Use	per farm	325.00	171.33	55.00	74.00
Fixed Costs					
Depreciation	per hour	18.08	15.99	21.99	22.80
Investment Cost	per hour	11.88	8.74	21.84	19.02
Insurance & Housing	per hour	3.31	2.44	6.11	5.32
TFC	per hour	33.24	27.17	49.94	47.14
TFC	per farm	10,801.82	4,655.76	2,746.80	3,488.17
TFC	per farm or co-op	10,801.82	13,967.29	2,746.80	10,464.50
Operating Costs					
Repair Costs	per hour	5.57	5.44	1.74	6.11
Fuel Cost	per hour	20.28	21.32	7.28	23.92
Lube & Oil Cost	per hour	0.60	0.96	0.23	0.63
TOC	per hour	26.45	27.72	9.25	30.66
TOC	per farmer	8,595.63	4,749.10	508.59	2,268.53
TOC	per farm or co-op	8,595.63	14,247.30	508.59	6,805.58
Total Machine Costs					
TMC	per hour	59.68	54.89	59.19	77.79
TMC	per farmer	19,397.45	9,404.86	3,255.39	5,756.69
TMC	per farm or co-o	19,397.45	28,214.59	3,255.39	17,270.08
TMC	per acre	12.93	6.27	2.17	3.84

Table B. Cost Comparison - Tractors, Direct Seeding System

		Large Tractor		Small Tractor	
		Individual Farmer	*Co-op Member*	*Individual Farmer*	*Co-op Member*
Number of Farms/Members		1	3	1	3
Acreage per Farm		1,500	1,500	1,500	1,500
Total Acres		1,500	4,500	1,500	4,500
Equipment					
Type		160-179 HP 2WD	250-299 HP 4WD	60-69 HP 2WD	180+ HP 2WD
Original Cash Cost		107,700.00	125,600.00	33,600.00	118,100.00
Salvage Value		10,770.00	12,560.00	3,360.00	11,810.00
Years Lifetime		23.00	18.00	23.00	20.00
Repair Cost Factor		0.0517	0.0433	0.0517	0.0517
Time Requirement					
Work Rate					
Annual Hrs. Use	total	136.00	257.00	111.00	219.00
Annual Hrs. Use	per farm	136.00	85.67	111.00	73.00
Fixed Costs					
Depreciation	per hour	30.99	24.44	11.84	24.27
Investment Cost	per hour	28.31	17.47	10.82	19.28
Insurance & Housing	per hour	7.92	4.89	3.03	5.39
TFC	per hour	67.22	46.79	25.69	48.94
TFC	per farm	9,141.62	4,008.73	2,851.98	3,572.53
TFC	per farm or co-op	9,141.62	12,026.20	2,851.98	10,717.58
Operating Costs					
Repair Costs	per hour	5.57	5.44	1.74	6.11
Fuel Cost	per hour	20.28	21.32	7.28	23.92
Lube & Oil Cost	per hour	0.60	0.96	0.23	0.63
TOC	per hour	26.45	27.72	9.25	30.66
TOC	per farmer	3,596.94	2,374.55	1,026.43	2,237.87
TOC	per farm or co-op	3,596.94	7,123.65	1,026.43	6,713.61
Total Machine Costs					
TMC	per hour	93.67	74.51	34.94	79.59
TMC	per farmer	12,738.56	6,383.28	3,878.41	5,810.40
TMC	per farm or co-op	12,738.56	19,149.85	3,878.41	17,431.19
TMC	per acre	8.49	4.26	2.59	3.87

Appendix A - Cost Calculations

Fixed Costs

Total Fixed Costs (TFC) are the sum of (i) Depreciation, (ii) Investment Costs, and (iii) Insurance and Housing. Fixed costs are calculated on a per hour basis and then multiplied by the annual hours used to get the Total Fixed Costs per farmer or co-op member and Total Fixed Costs per farm or co-op.

i) Depreciation per hour = $\frac{\text{((Original Cash Cost - Salvage Value)/Years Lifetime)}}{\text{Annual Hours of Use}}$

- Original Cash Cost is the cash price paid for a new machine without a trade as reported in the *Farm Machinery Custom and Rental Rate Guide 1998*.
- Salvage Value is assumed to be 10 percent of Original Cash Cost.

ii) Investment cost per hour = $\frac{\text{((Original Cash Cost + Salvage Value)/2) x 6.5 percent}}{\text{Annual Hours of Use}}$

- An interest rate of 6.5 percent is assumed.

iii) Insurance and Housing per hour = $\frac{\text{Original Cash Cost x 1 percent}}{\text{Annual Hours of Use}}$

Operating Costs

Total operating costs (TOC) per hour include (i) Repair costs and, in the case of self propelled machines, (ii) Fuel costs and (iii) Lube and Oil costs.

i) Repair costs are calculated on an hourly basis per $1,000 of original cost.

$$\frac{\text{Original Cash Cost}}{1000} \times \text{Applicable Cost Factor}$$

- The Applicable Cost Factor is developed by the American Society of Agricultural Engineers to estimate average annual repair costs for various types of machines and levels of use (listed in Appendix F, Column E of the *Farm Machinery Custom and Rental Rate Guide 1998*).

ii) Fuel costs per hour are based on those reported in the *Farm Machinery Custom and Rental Rate Guide 1998* for the combines and tractors of the appropriate size and annual hours used.

- Diesel fuel is charged at $0.52 per litre, gasoline is charged at $0.55 per litre.
- The 7 percent GST was deducted in calculating the gasoline and diesel prices because farmers can apply for an input tax credit on these items.

iii) Insurance and Housing per hour = $\frac{\text{Original Cash Cost x 1 percent}}{\text{Annual Hours Use}}$

Appendix B - Hourly Tractor Rental Costs

Machine Size	*Original Cost*	Rental Costs ($/Hour) *Annual Hours of Use*				
		200	*300*	*400*	*600*	*800*
60-69 HP 2WD	33,600	27.04	22.42	19.92	16.91	15.50
80-89 HP 2WD	49,600	38.49	31.68	27.98	23.54	21.45
140-159 HP 2WD	93,800	71.69	58.81	51.82	43.41	39.46
160-179 HP 2WD	107,700	83.48	68.69	60.66	51.01	46.48
180+ HP 2WD	118,100	93.19	76.97	68.18	57.59	52.62
250-299 HP 4WD	125,600	94.08	76.83	67.47	56.22	50.93

Appendix C - Tractor Cost Estimates For Machinery Sets

The cost comparisons of the two tractors under the assumptions discussed for the conventional seeding system is illustrated in Table A. As is shown the total machinery cost per farmer per year for both tractors is similar for both the individual farmer and the co-op member, with the co-op member saving $1,450 per year (or 5 percent).

The cost comparison of the two tractors under the assumptions discussed for the direct seeding system is illustrated in Table B. As is shown the total machinery cost per farmer per year is for both tractors is lower for the co-op member than the individual farmer, with the co-op member saving close to 21 percent in total machinery costs per year.

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